THE INDEPENDENT GUIDE TO **IBM** PERSONAL COMPUTERS

PBR

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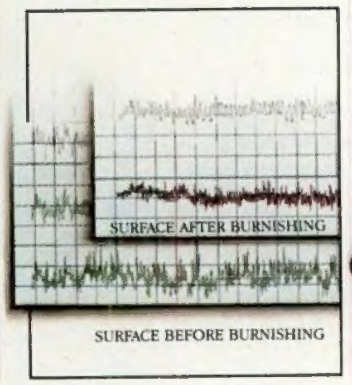
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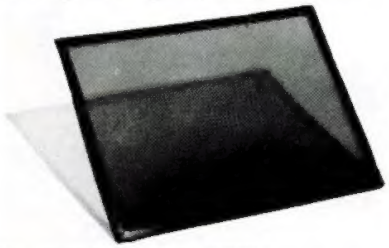
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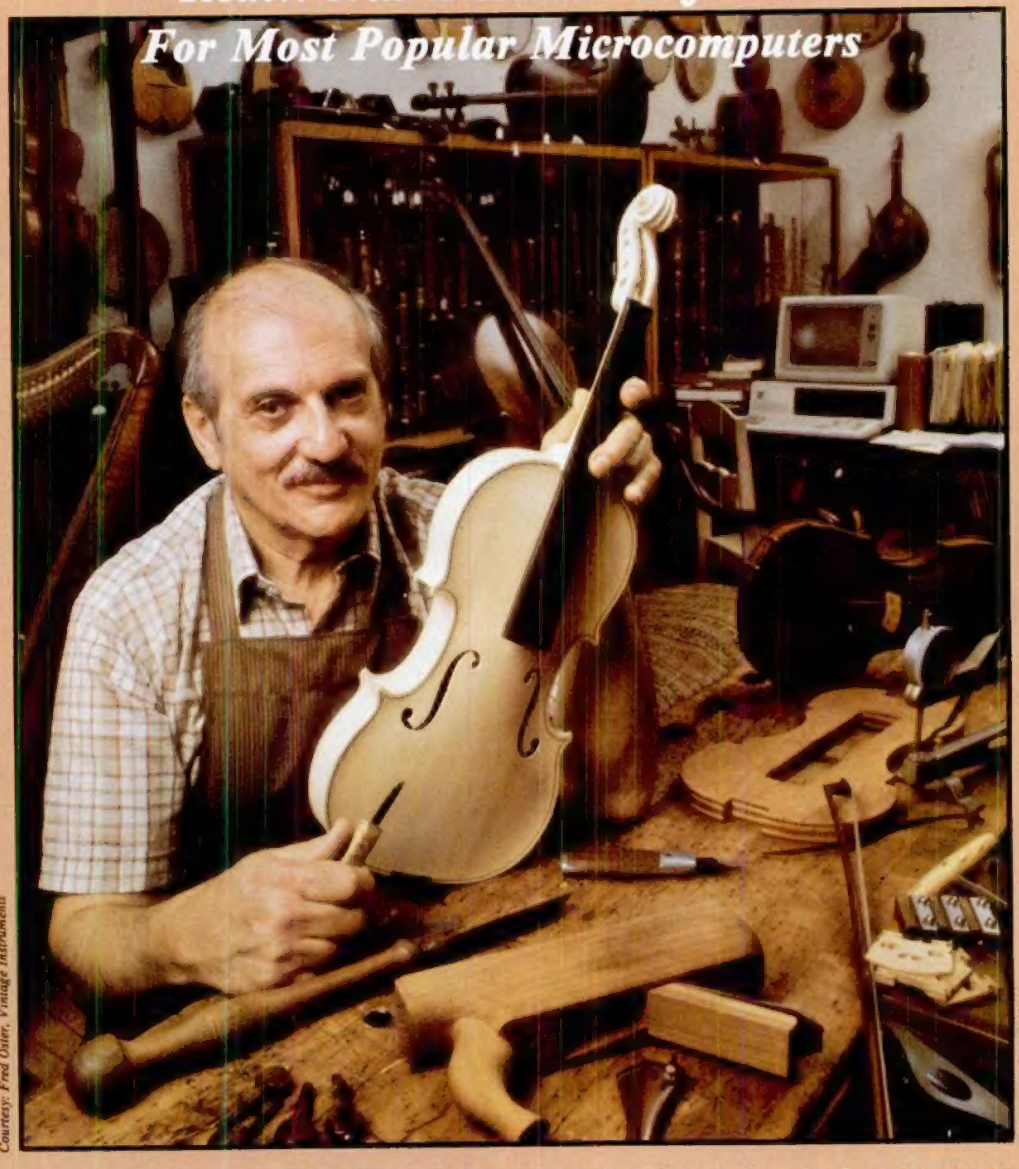
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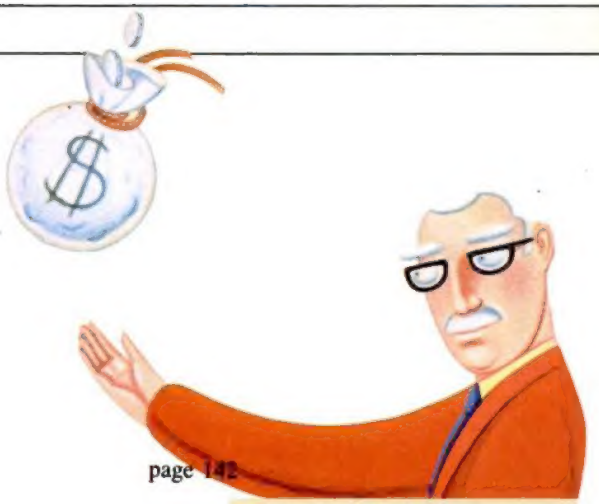
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The Independent Guide to IBM Personal Computers

VOLUME 3, NUMBER 7
APRIL 17, 1984



page 142

COVER STORIES

INTEGRATED SOFTWARE
Easy As 1-2-3 122
Stephanie Stallings/This issue takes a grand tour of the great integrated software packages, starting with *1-2-3*.

1-2-3 Links Arms With Business 125
Stephanie Stallings/Users can combine *1-2-3*'s functions into unique business tools.

Handing Off Your 1-2-3 Files . . . 129
George D. Hughes, Jr./How to transfer *1-2-3* files to other vendors' programs.

Armed For Learning 1-2-3 133
William K. Howard/Which of the available tutorials is the best learning aid for *1-2-3*?

FUNCTIONS: KEEP YOUR EYE ON THE BALL
Thumbing Through The Spreadsheets 144
Jared Taylor/The spreadsheet components of five integrated packages.

Touching Base With Database Managers 152
Glenn Hart/The database management capabilities of integrated packages vary from powerful to nearly nonexistent.

Two Cheers For Execu/WRITER 161
Bill O'Brien/This word processor is the weak link in the *SeriesOnePlus* package.

Getting A Grip On Graphics 165
John Schnell/The graphics modules of *1-2-3*, *SuperCalc*^{3}, and *VisiCalc IV*.

STANDING UP TO 1-2-3
SuperCalc^3 Grows On You 174
Diane Burns and S. Venit/It's *SuperCalc*^{3} versus *1-2-3*.

Still Blooming After All These Years 179
Barbara E. McMullen and John F. McMullen/*VisiCalc IV* versus *1-2-3*.

Love IT Or Leave IT 189
Don Layman/Presenting the IT Series.

SeriesOnePlus Shows Its Tangled Roots 193
Diane Burns and S. Venit/*SeriesOnePlus* integrates its components awkwardly.

The Metaphysics Of METAFILE 196
George D. Hughes, Jr./A fully integrated database management system.

Prepare To Meet Your T/Maker III 207
Frank J. Derfler, Jr./A new PC-compatible version.

Desq: Through An Open Window 214
Robin Webster/Here's the advance word.



FEATURES

BOOK EXCERPT
Assembly Language: The IBM Macro Assembler 221
Robert Lafore/Introducing the Macro Assembler.

APPLICATIONS
PCs In Pinstripes 252
Paul Somerson/A PC on every desk?

Will Middle Management Survive The PC? 262
Nat Sakowski and Leslie Baker/The effects of PCs on middle management.

Software For A Taxing Solution 280
David McManigal/Spreadsheet programs can help take out the income tax sting.

The Typesetter Connection 309
Betsy Simnacher/Micros and typesetting equipment are pairing up.

SOFTWARE
Dapper's Rite Of Passage 268
Michael Muskal/This electrical engineering program has finally found a niche.

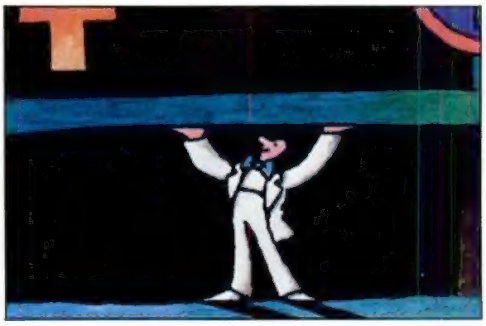
IBM EYE
Hi-Sci From IBM's Think Tank 275
Lester Brooks/The latest research.

TRAINING
Are Disk Tutorials The Best Teachers? 291
Susan Wolbarst/Disk-based tutorials are convenient, but do they really teach?

OPERATING SYSTEMS
Choosing The Pick Of The Litter 321
Steve VanArsdale and Jonathan Sisk/The Pick operating system structures data the way people think.

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page 268



page 280

PRO COLUMNS

WRITING
PC Filing: It's In The Cards 349
Steve Rosenthal/Card file programs give you the electronic equivalent of a pack of index cards.

EDUCATION
Acronyms For Education 353
Harold Goldes/Educational software programs can be classified according to the learning techniques they use.

BUSINESS
Take $5,000 And Thank The IRS 359
Laura Lou Meadows/The IRS may have a pleasant surprise for you and your computer—but before you file, make sure the tax deduction will benefit you or your business.

FINANCE
Electronic Investment Advice . . . 363
Donald R. Woodwell/The *Evaluation Form* financial program can help you stay on top of your investment decisions.

DESIGN
PC Drawing Power 367
Allen E. Meilach/*PCcrayon* and *4-POINT Graphics* offer pixel-based painting for the PC with graphics creation, animation, and more.

PROGRAMMING
Driving With ANSI.SYS 445
Stephen P. Smith/The PROMPT command is the key to using ANSI.SYS, a loadable device driver for DOS 2.0.

TELECOMMUNICATIONS
XMODEM: A Standard Is Born 451
Alfred Glossbrenner/This file transfer protocol is gaining a big following—and it's free.

DEPARTMENTS

WHAT'S INSIDE 15

PC NEWS 33
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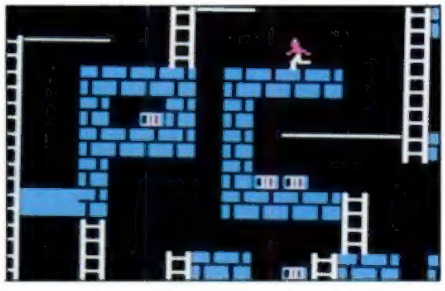
FROM THE EDITOR'S SCREEN
Synthesis, Anyone? 69
Bill Machrone/The Mac has arrived and the Apple versus IBM battle lines are being drawn.

LETTERS TO PC 75

GUEST EDITORIAL
Lovers And Other Computers 97
Dennis O'Brien/Can personal computers become our friends and lovers?

THE NORTON CHRONICLES
Keeping Subdirectories Simple . . 113
Peter Norton/A simple, uncluttered approach to subdirectories is the most practical one.

SANDLER'S SCREEN
Silicon Valley Days, 1983 331
Corey Sandler/Here's how the microcomputer soap opera shaped the industry last year.



PC ARCADE
Haute Cuisine And Hot Dogs . . . 335
Corey Sandler/Bright *Load Runner* outshines dull *BurgerTime*.

BOOK REVIEW
The Cream Of The Crop 343
Luther Sperberg/Five computer books that stand out from the crowd of unhelpful lookalikes.

NEW ON THE MARKET 371
David Obregón/The latest in hardware, software, accessories, publications, and services.

USER-TO-USER 401
Paul Somerson/PC owners share their tips and short programs.

CLUB NEWS 405
Susan Hurley/Listings of dozens of IBM PC user groups.

PC BLUEBOOK 412

PC TUTOR 429
Mark Zachmann/Answers to questions about personal computing.

PC: MART 430

PRODUCT INDEX 441

ISSUES
Bringing Out The Big Guns 457
L. J. Kutten/How to get tough with the manufacturer when you have legitimate complaints about hardware or software products.

INDEX TO ADVERTISERS 465

COMING UP

PC Disk 462
PC Tech Journal 464
PC Magazine 469

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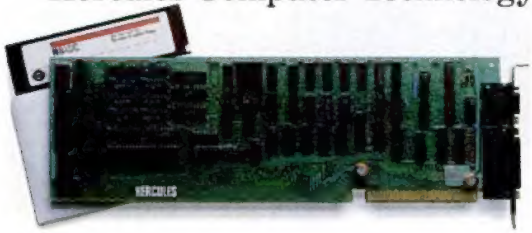
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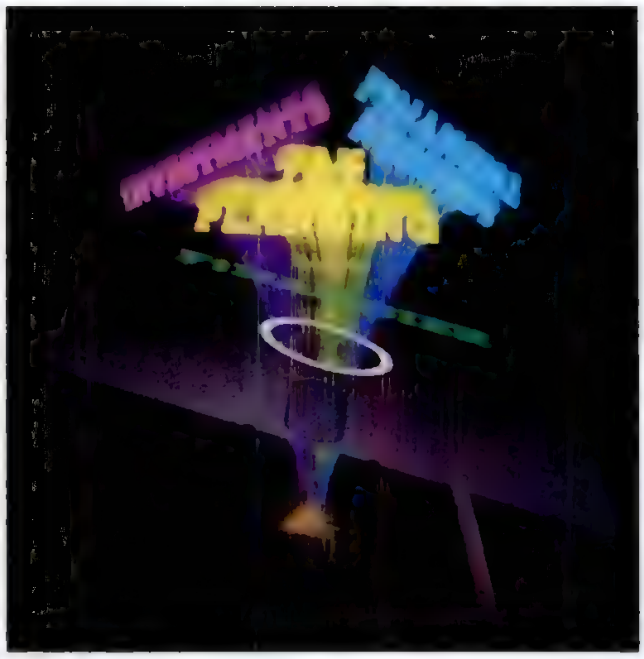
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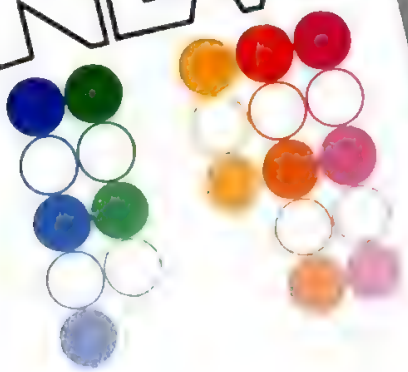
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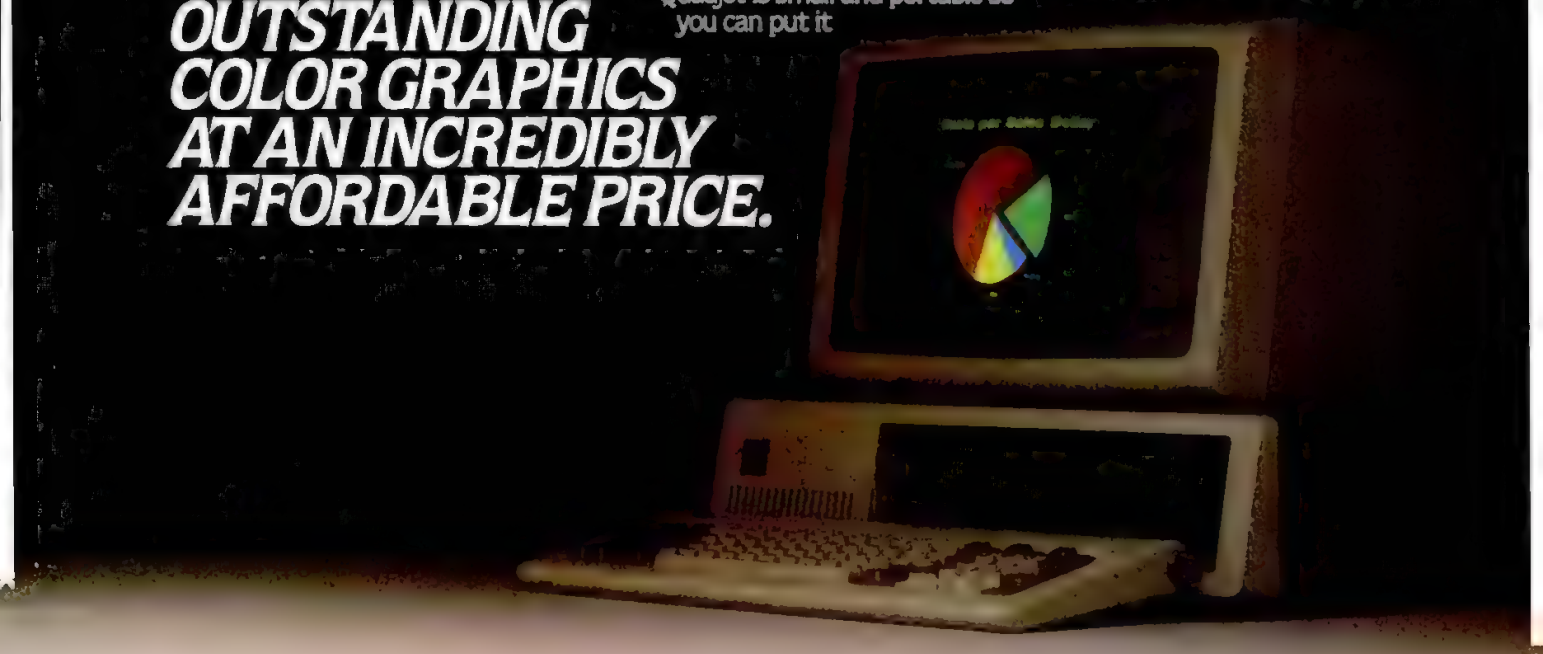
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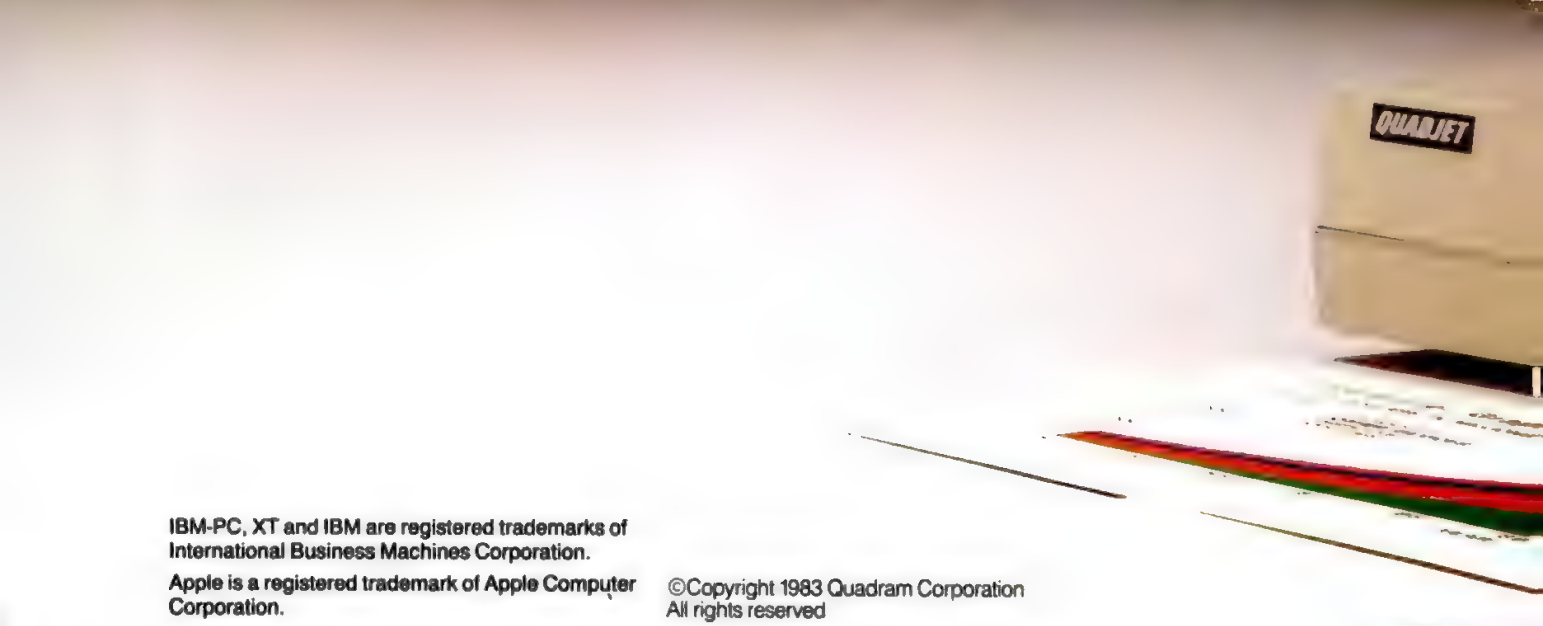
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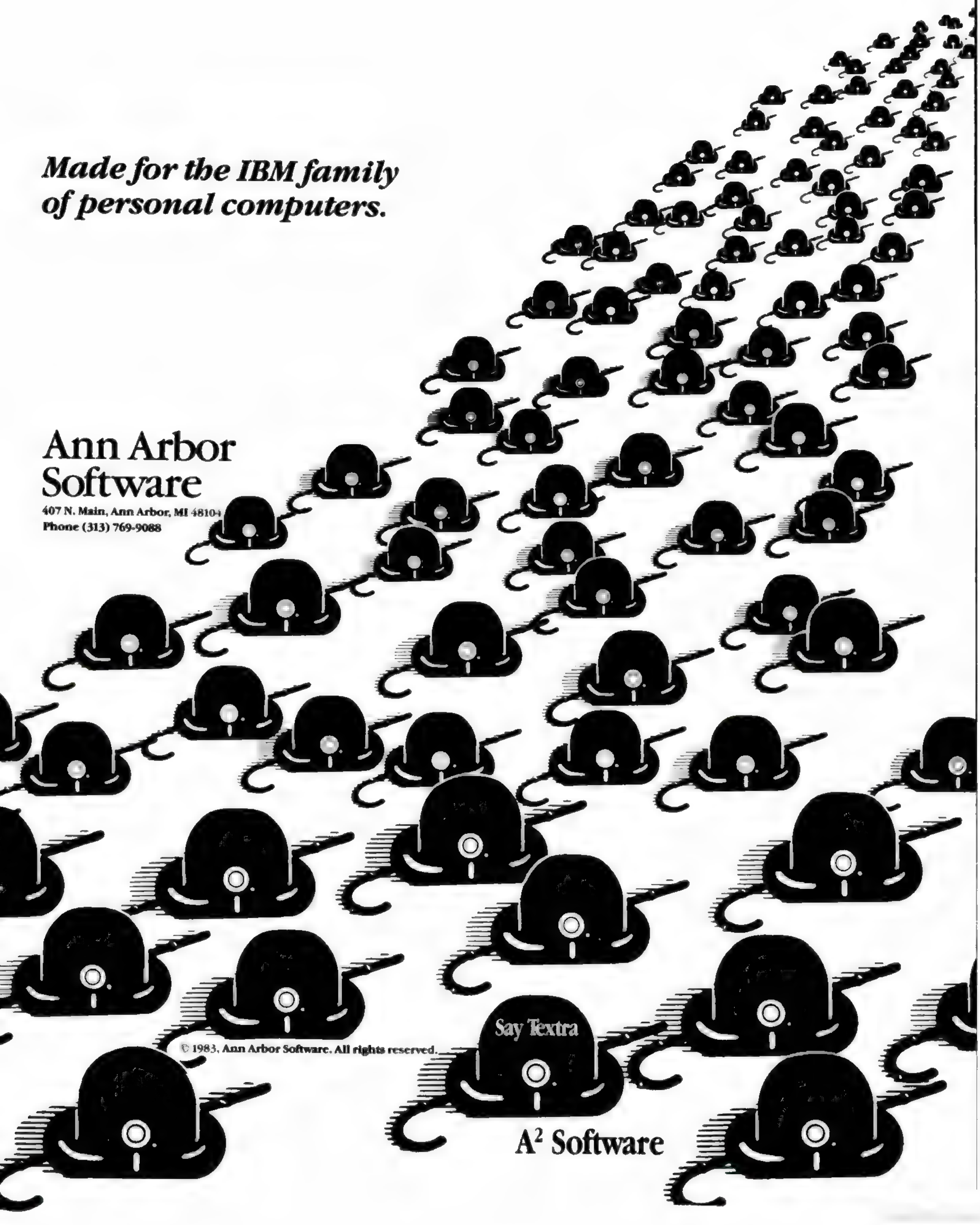
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What's Inside

PC's efforts to report on integrated software packages were hampered (as usual) by problems in getting complete and up-to-date review copies from the manufacturers.

When one company comes out with a new type of software package, others will follow by bettering that package or, at the least, by giving it a run for its money. In our last issue, we covered the newest computers that are attempting to compete with the IBM PC. This time, we are exploring the new competitors of a softer type of product: integrated software packages.

The definition of the word *integrate* in *Webster's New Collegiate Dictionary* reads: "to form or blend into a whole." The definition of *integrated software* should, therefore, be "software that, when used together, creates an efficient package in and of itself." However, the story behind integrated software (and our cover package) is a little more complicated than that.

For one thing, many software packages that claim to be "integrated" actually may not be so integrated. For example, a user may have to leave the file currently onscreen in order to access a different function—which is not how an integrated package is supposed to work. In addition, one or more of the package's functions (spreadsheet, graphics, etc.) may be so weak that it is useless, possibly rendering the rest of the software useless, too.

So, we decided to sort through and take a careful look at the major integrated software packages. While the cover stories in this issue of *PC Magazine* may be about integrated software, our efforts to put together the cover package were perhaps not quite as integrated as our editorial staff could have wished.



Illustration: Mike Kanarek

Associate editor Stephanie Stallings would certainly agree. It was Stallings who organized the project, obtained software, and rounded up the writers. In a council of war with editor Bill Machrone and executive editor Mike Edelhart, she compiled a list of 16 companies that had advertised integrated software packages. She contacted these firms and requested that copies of their products be sent as soon as possible.

Those of you who read the April 3 issue's "What's Inside" (which reported the reactions of various computer manufacturers to our offer to test their products for PC compatibility) may be able to guess what followed. Out of the 16 companies contacted, only half had software packages that were actually ready to be shipped and tested. After 3 days of calling, recalling, and returning phone messages that always seemed to come during the 5 minutes no one was in the office, the responses of the eight others began to take on a monotonous tone, or so it seemed to Stallings.

Far and away, the most popular excuse seemed to be: "It won't be ready until the first quarter of 1984," Stallings reported. She was beginning to think that line was a standard cover for a multitude of sins. One can almost picture the entire software industry meeting secretly to plot strategy in some dark Palo Alto alley (does Palo Alto *have* dark alleys?).

"What should we tell them?" hisses one panicked executive. "They've already called Softrend, and they'll be getting to us first thing in the morning."

"You fool!" murmurs another scornfully. "Just tell them that your package isn't fully tested yet and that it will be ready in the first quarter of 1984."

"And if it isn't ready by then?"

"It will be too late for them to do anything about it by then. And anyway, there are always the second, third, and fourth quarters to look forward to."

Be that as it may, eight software companies supplied us with their integrated packages. It was decided that the best way to present the story was to test the packages in two different ways: First, to compare each to Lotus' *1-2-3*, the leader in the integrated software market, and second, to take each package and separately examine the merits of its database, spreadsheet, graphics, and word processing programs. After all, a software package may be superbly integrated, but what good is it if a database loses data, a spreadsheet doesn't calculate, a graphics program uses only monochrome, or a word processing program doesn't accept words of more than two syllables?

In order to do a thorough testing job, we needed to contact and coordinate the efforts of 12 different writers. As a *PC* reader, you may visualize the typical *PC* writer as either a serene, pipe-smoking academic who can discern a computer's true character after 30 seconds at a keyboard, or a nervous, thin, excitable techie who speaks some strange amalgam of English and BASIC.

Well, for the most part, you're absolutely right.

However, our writers are also individuals, and as individuals, they took on the project with a will and a dedication that would have done the Royal Canadian Mounties proud.

Take for example, the four gentlemen who wrote the functional reviews: Glenn Hart turned out his piece nearly simultaneously with his article for the last issue of *PC*; Jared Taylor wrote his story while suffering from the flu; John Schnell was forced to make three trips to our offices to photograph graphics screens because the camera failed the first two times. In fact, of all the "functions" reviewers, the only person who had it easy was Bill O'Brien, who accepted the job of reviewing the word processing modules when everyone else had rejected it as "too boring." However, he found that only one package had enough word processing capabilities to review!

George Hughes had it fairly easy, too. Since he is one of those remarkable individuals who apparently owns every piece of software that is now or has ever been produced, we didn't have to send him a thing. Stallings simply read him a list of the software that needed reviewing, and he reviewed it.

Frank Derfler offered to review Mosaic Software's *Integrated 6*, until it turned out that there was only a demonstration copy available, so he ended up instead with *T/Maker III*. And Don Layman had to hang on until he was finally sent the ITSoftware package: *KeepIt*, *CalcIt*, and so forth. (We will forbear from mentioning any of the lame puns that have resulted from the ITSoftware Company's choice of nomenclature.)

The only person who had it easy was Bill O'Brien, who reviewed word processing modules. However, he found that only one package had enough word processing capabilities to review!

Diane Burns and Sharyn Venit ran into a problem that's not uncommon when dealing with software manufacturers. The first copy of Executec Corporation's *SeriesOnePlus* they were sent turned out to be slightly out of date. They waited patiently for the company to send them the latest version (all the while wondering whether it would arrive before their deadline). You can read for yourself what they thought of *SeriesOnePlus*.

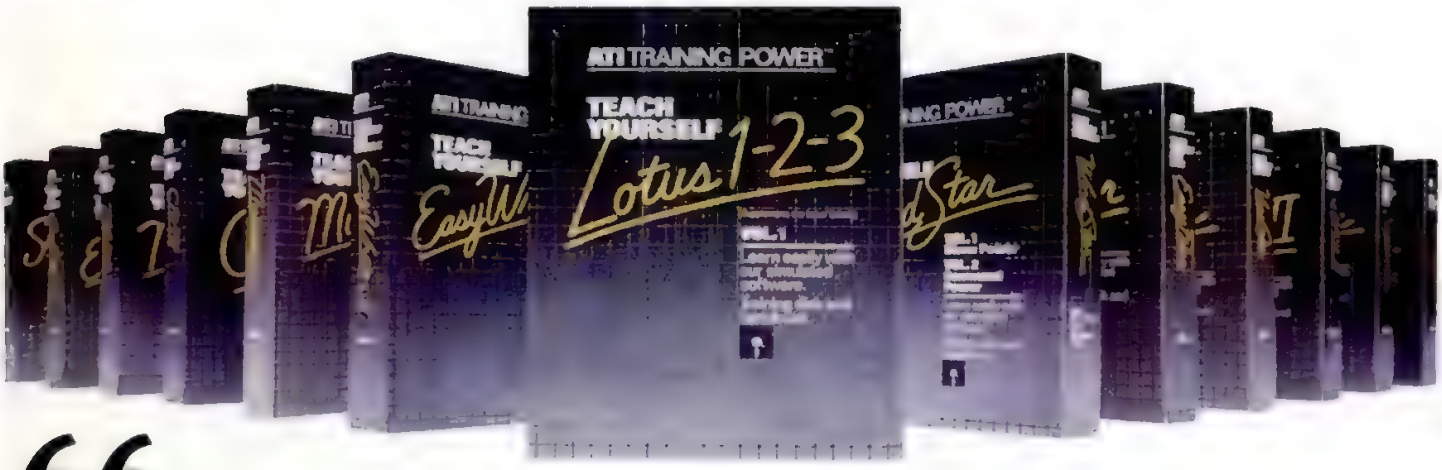
However, the prize for patience under fire must go to Robin Webster, who obligingly agreed to evaluate at least one integrated software package. He was first sent VisiCorp's *Visi On*, but it simply did not work out. He then tried Sofstar's *BPT*, but it turned out not to measure up as an integrated package. Schuchardt Software Systems actually sent him its *InteSoft* package—or at least one part of it, since the other parts (typically) weren't quite ready. Ovation Technologies' integrated program wasn't quite ready, either. At long last, Webster was able to get hold of Quarterdeck Office Systems' *Desq* package, which is previewed in this issue.

Since packages like *Desq* may be perfectly suitable for many users' purposes without competing directly with Lotus' *1-2-3*, we asked our writers to also give us standalone reviews of several interesting products, including *Metafile*, *T/Maker III*, *Desq*, and the MicroPro software family.

Finally, to ensure that we have presented as much information as possible, we are also including several articles that explain how to take full advantage of the top integrated software package on the market: Lotus' *1-2-3*. We have included an article by George Hughes on hooking *1-2-3* to other software packages, Richard Werbin's and Stephanie Stallings' wish list for what new things they would like to see *1-2-3* do, and a discussion of users who are creating unique applications for *1-2-3*.

So as you can see in the following pages, the job was at last accomplished. Our writers have been sent their well-earned checks, associate editor Stallings has been sent away for a well-earned rest (she got an entire weekend off!), and we can safely say that we have given you a comprehensive overview of the integrated software packages now on the market. ■

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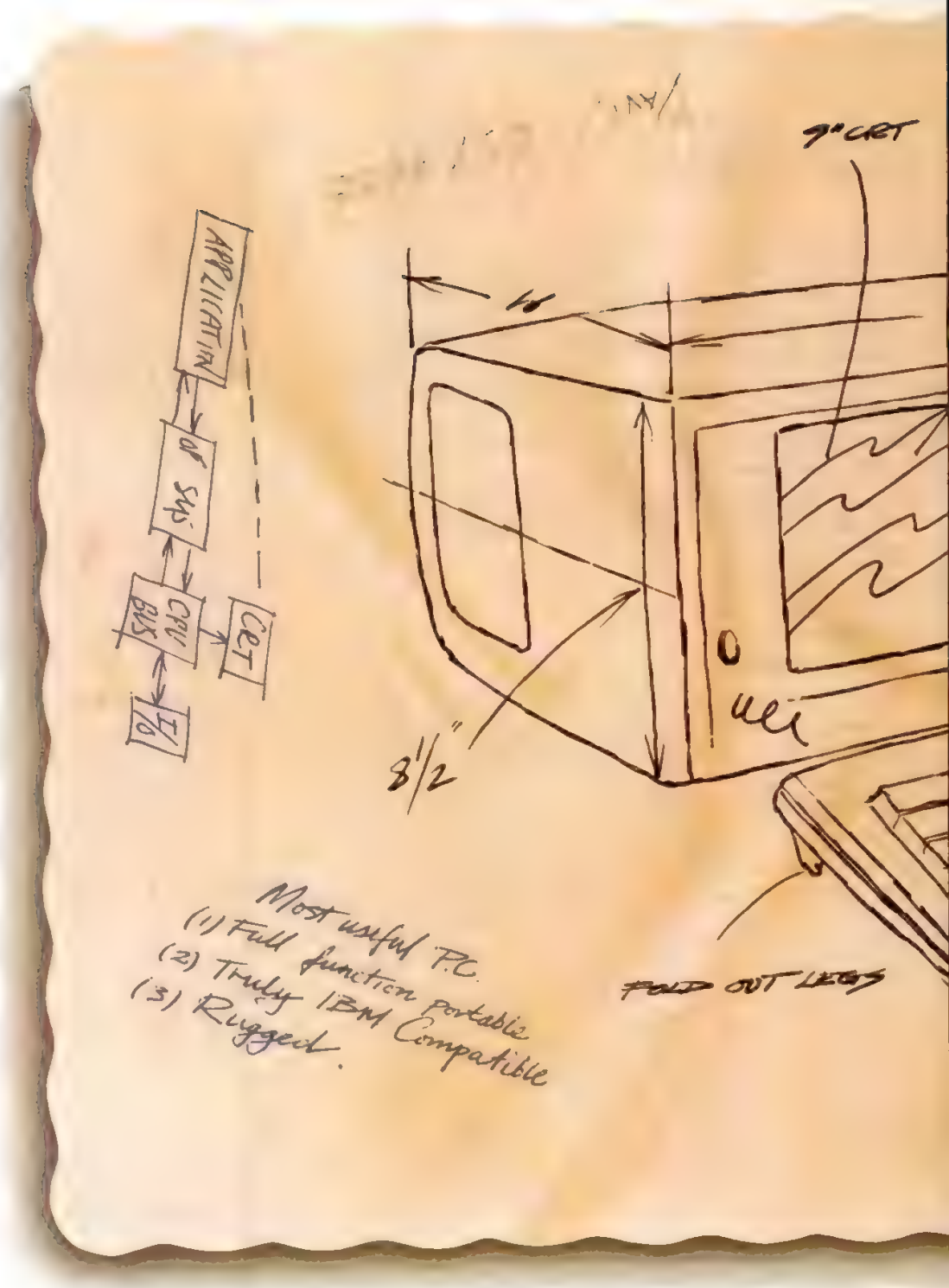
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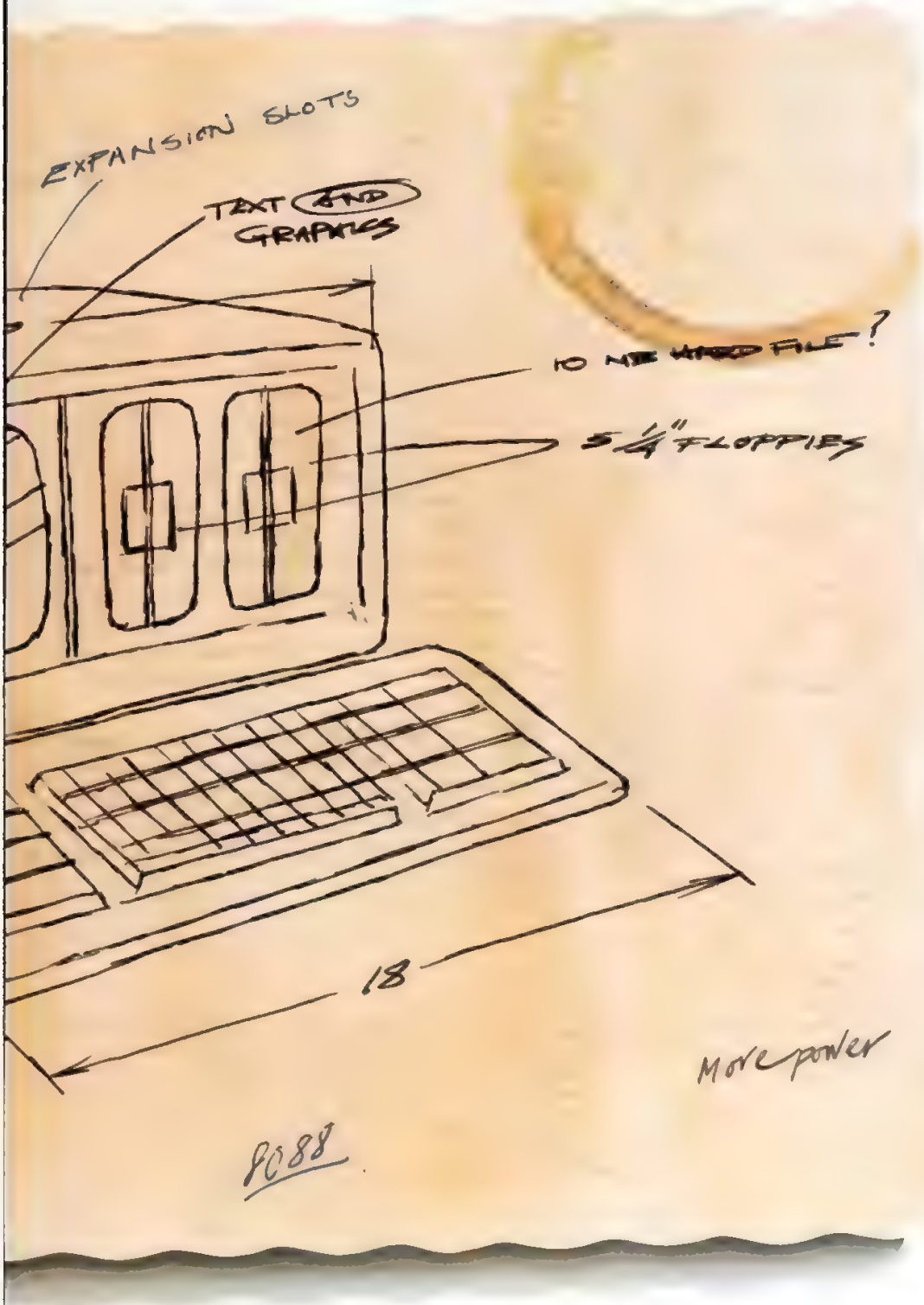
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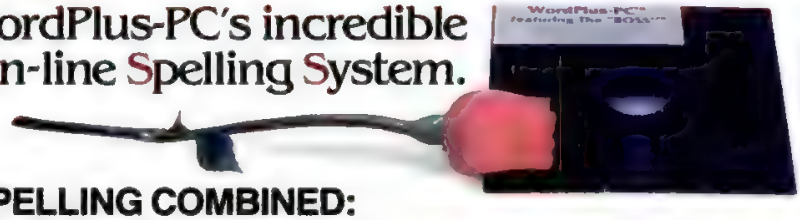
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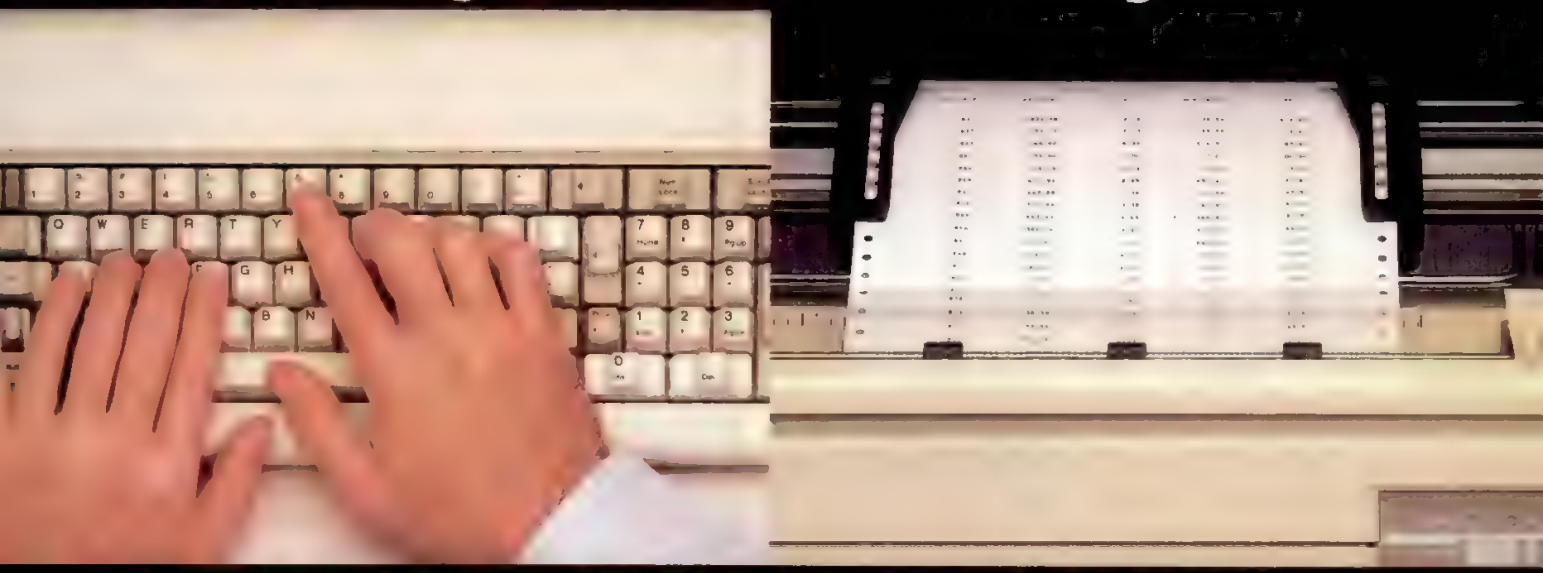
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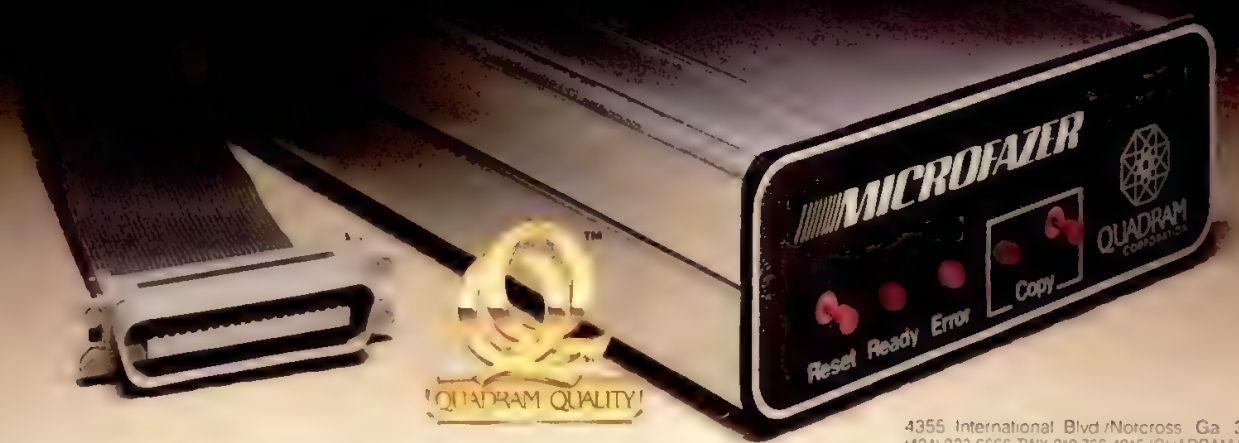
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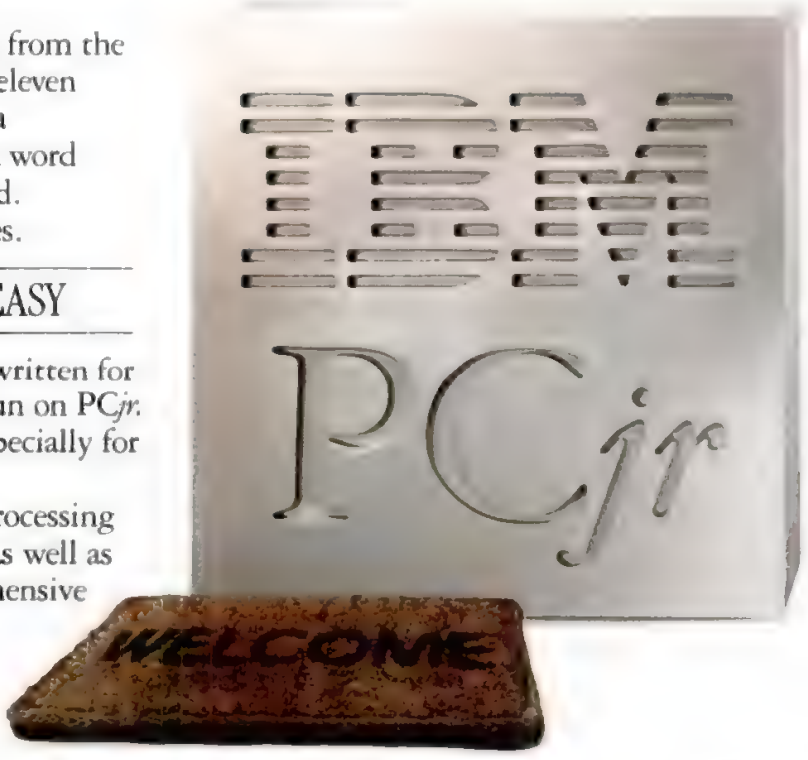
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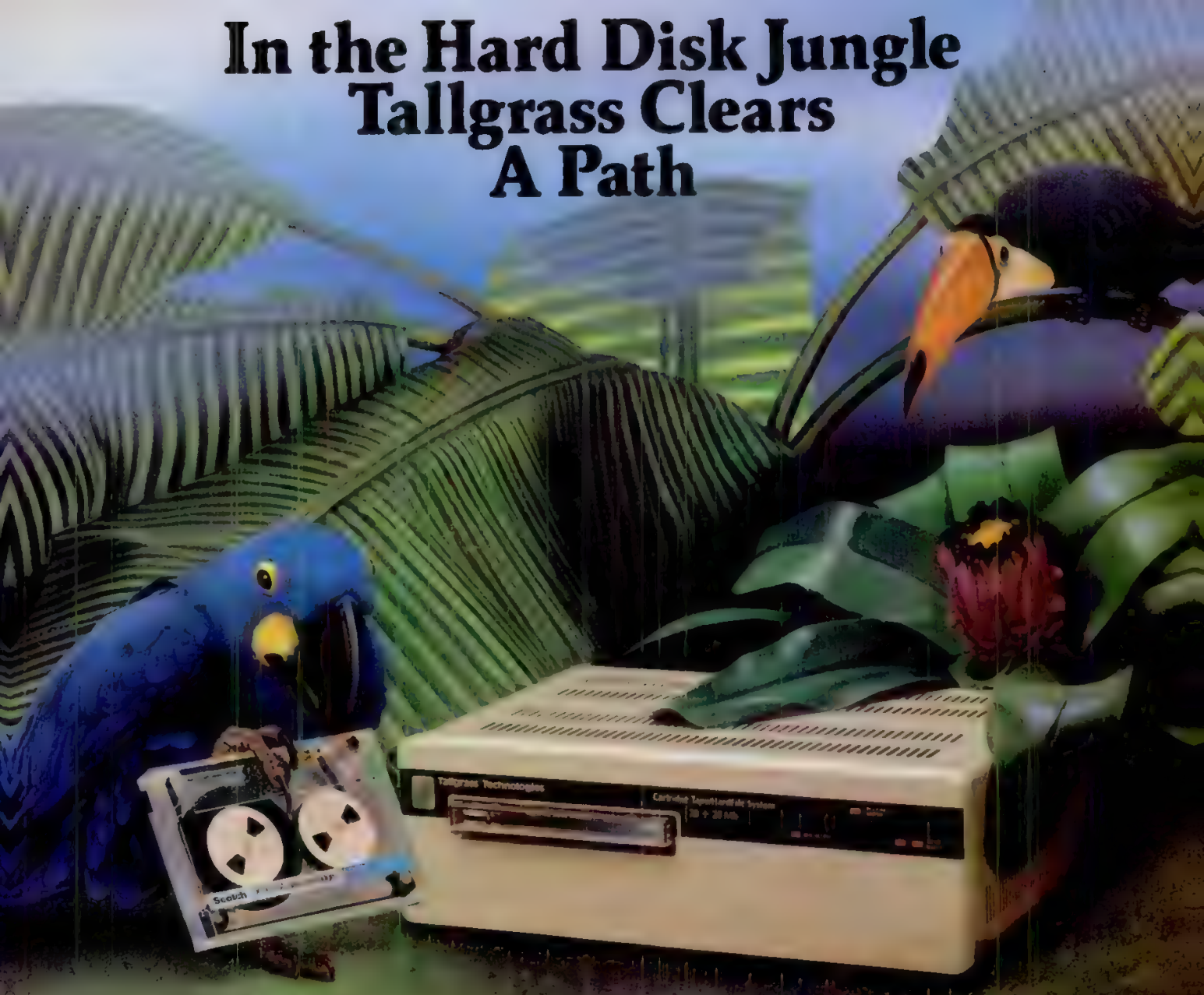
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IBM Personal Computer Trends and Developments

PC News

FROM THE EDITORS OF PC

APRIL 17, 1984

New Cluster Network and Portable in IBM's Bag

Suddenly, a portable PC-compatible with IBM's own name on the box

BY CONNIE WINKLER

BOCA RATON, Fla.—The IBM PC now comes in a portable version—and it may even have simple networking cables hanging off of it.

IBM's dealers put the new IBM Portable Personal Computer on display in March, although initial supplies of the 256K, 30-pound box with a $2,795 price tag were expected to remain limited for a while.

Expected in May is another new line, the new IBM Personal Computer Cluster products that will connect the portables, PCs, PC-XTs, and stripped-down PC*jr*s at a cost of less than $500 per station. "It's a no-frills network," was the comment of one PC dealer.

IBM, in its mid-February announcement of the two products, said that as many as 64 computers could be connected in one cluster—with performance varying depending on the combination and number of systems connected, and the types of applications run within the cluster.

PC dealers and industry observers called the Portable PC announcement—and the hardware itself—predictable. "It gives credibility to the portable market just like the PC gave credibility to personal computers," said one of IBM's top dealers. Ironically, the company that pioneered the portable computer, Osborne Computer, declared bankruptcy only a few months ago.



Compaq's Reaction

"Underwhelming," is the response from Compaq Computer, which has soared on the jetstream of the PC's success

(continued)

IBM Suit Eyes Eagle

IBM is continuing its legal actions against its compatible rivals (See PC News, Issue 6). The latest target is Eagle Computer, based in Los Gatos, California. Like Corona Data Systems and Handwell Corporation, the previous targets, Eagle settled a suit charging that it had infringed against copyrighted software in IBM's BIOS (Basic Input-Output System) chip. Eagle said it would change the BIOS chip programming in all computers shipped after March 6.

Who's next? ■

Feast of New PC Software At Softcon Mardi-Gras

The first Softcon is the site for debuts by disks full of communications, mainframe-to-micro, and database software

BY CONNIE WINKLER

NEW ORLEANS—Software suppliers are searching for new ways to snuggle up to users. A quick survey of the first Softcon, the trade show for microcomputer software firms, reveals more database management systems, packages analyzing human behavior, and packages that help PC users do more with their PC.

The best example shown in the helpful, application-on-top-of-explication genre is *In-Search* from Menlo Corp. of Santa Clara, California. It gives quick access—by touching sev-

(continued)

Portable *(continued)*
with its portable IBM-compatible computer that was introduced in January of 1983. The Houston-based company sold $111.2 million worth of Compaqs in its first year and established a good reputation with its products.

"It's nice that it's finally out," said Compaq vice president Kenneth Price about the new IBM Portable PC. "Everybody knew it was coming."

Price doubts that Compaq will respond with a "kneejerk" price cut on its computer: A basic 256K RAM, dual-floppy unit is already available from dealers for as low as $2,495, he said. Compaq also has a hard disk portable.

"It looks like Compaq is going to have to lower its price, but so is IBM on its PC," said Esther Dyson, echoing other users and manufacturers.

IBM's PC Cluster

Dyson believes IBM's cluster network may be just right for small offices with several PCs. "It's an alternative to the pedestrian network," she offered lightly. The pedestrian network she refers to is the one that exists in most offices where, for example, letters are drafted on a PC, then copied onto a diskette that is physically walked to the printer or a secretary's desk.

IBM didn't make any samples of its cluster network available, but according to the industry insiders and dealers who received early word, IBM's network is a bus-type, straight, point-to-point system, running on 75-ohm coaxial cables no more than 1,000 feet in length.

Whereas larger local area networks (LANs) might have a dedicated minicomputer as the file server, the IBM cluster requires the hard disk of the XT as its server. This gives the IBM cluster about one-thirtieth the performance of, say, the Ethernet-like network made by 3Com Corporation of Mountain View, California. The 3Com network transmits data at about 10 megabits per second, versus about 375 kilobits per second for the IBM version. While such performance may be suitable for a classroom—which might have a multi PC*jr* configuration—it's too slow for many offices, says the dealer. (He added that, even in a classroom, a cluster with 64 PC*jr*s "seems kind of unrealistic.")

The specifications that IBM has released to date resemble those of a number of PC-compatible network products. Those who know aren't yet saying which one, if any, it is. Some observers feel this is intentional on IBM's part.

When it acts as the file server, the PC-XT can continue to be used as a workstation—but with considerably limited performance, the insiders say.

Where PC*jr* Fits In

The IBM announcement states that only the entry $700 model of PC*jr*—with no disk drive—can be attached to the cluster. This requires a PC*jr* cluster attachment ($400) which attaches to the side of the entry-model PC*jr*. "In the future, IBM intends to provide the ability to attach all current PC*jr* models to the cluster," the Entry Systems Division says.

Attaching other PC models (including the new Portable PC) requires the IBM Personal Computer Cluster Adapter ($340) that fits into one of the full-size expansion slots of the system unit. Running the cluster also requires a licensed program from IBM, the *Personal Computer Cluster Program*, for $92 per station; a *Personal Computer Cluster Program* Five-Pack is priced at $400. The Personal Computer Cluster Cable Kit is $110.

Compared to the cards for other network systems, which run up to $950, the IBM network could be perceived as a bargain by some users, a networking dealer said. Although priced separately, a typical package at IBM Product Centers is expected to be about $2,450 and would run on one XT and four PCs. "If people don't know any better, they may not mind the speed differential," he added."There are a lot of people out there with two to four PCs."

IBM's Fancier Networks

Last year in Zurich, Switzerland, at an international communications conference, IBM unveiled a new, sophisticated token-passing local area network. It's believed, however, that the company is holding back on introducing such network technology because of its importance to the office marketplace—and because of the technical complexity of it all.

Then why release the cluster network? "IBM wanted to get something out there to keep their customers happy," an IBM dealer offered.

IBM's Timing

The product announcement came shortly after IBM sent information to its dealers about the new products. A news article had appeared in the *New York Times* reporting that the Portable would be coming. That leak and subsequent news reports apparently prompted IBM to hurriedly announce not only its Portable PC, but to add the Cluster announcement, which was expected to come closer to the product's May availability date.

"What's interesting is that IBM seems to be getting a lot more swinging," said Dyson about the product announcement. "They used to give dealers 30 days notice. They tried to tie them up with letters and agreements, but they can't get them to keep quiet anymore."

"I keep being surprised—but I'm less surprised than I used to be." ■



Softcon *(continued)*
eral buttons and going through several menu screens—to one big information service so far, and more will be added, said Robert B. Tabke, co-founder and Menlo vice president. *In-Search* is designed to save expensive telephone time when searching through on-line services.

In-Search provides windows and menu-prompting to help users searching the 200 databases available in Lockheed's Dialog service. The $399 product includes the copy-protected system disk (which can be loaded on a hard disk) and four disks each of which indexes one of Dialog's service categories: arts and social sciences, biology and medicine, engineering and science, and business. Menlo plans to add several databases a month, with the index disks being updated automatically whenever a user accesses the system.

"On-line searching is going to be the biggest use of PCs," predicted Tabke, echoing many futurists and consultants on the move toward the information age. Menlo, which has the backing of several leading venture capital firms, said its product would be on the shelves in March.

Intellect for the PC

"Ask and you shall retrieve," teases the brochure for another company offering information-accessing products for the PC—the Artificial Intelligence Corporation (AIC). This company will have a PC version of *Intellect*, a mainframe program licensed by IBM, by the end of the year, according to Jane Eisenberg, AIC's director of microcomputer products. *Intellect* is the first and—so far—only commercially viable natural-language software product. This

What's in the Bag? IBM's New Portable

An inside look at the Portable PC

BY CONNIE WINKLER

BOCA RATON—"The IBM Portable Personal Computer offers high performance in a portable package that can go where the work is—in the office, at home or in the dormitory."

Those words are notable because they come from the IBM maverick, Philip D. Estridge, who pushed the development of the famous Personal Computer within IBM. Estridge, now IBM vice president and president of the Entry Systems Division here, has another baby—one that fits in a tote bag.

The new IBM Portable PC at IBM Product Centers will cost $2,795 or $3,220 with an additional half-height, 360K disk drive. It incorporates many of the technologies of the PC, including the Intel 8088 chip and PC-DOS 2.1.

Other features include:

- 256K (262,144 characters) of random access user memory, expandable to 512K.
- Built-in, 9-inch amber monitor that displays graphics and up to 25 lines with 80 characters per line.
- Universal power supply for use in different countries with the addition of an appropriate power cord.
- Dimensions of 20 by 17 by 8 inches and a weight of about 30 pounds.
- 360K (368,640 character) slimline diskette drive and adapter.
- Color/graphics monitor adapter.
- Five additional expansion slots in the system unit.
- Carrying bag with handle for the system unit.
- 12-month limited warranty.
- Optional second disk drive which would double storage capacity to 720K.

The IBM Portable PC uses the same 16-bit Intel 8088 microprocessor used in the IBM PC, XT and PC*jr*. With IBM's PC-DOS 2.1 (which was released at the time of the PC*jr*) the Portable PC can use most of the software already available for the IBM PC.

"From a function and performance standpoint, the IBM Portable Personal Computer has identical characteristics to an equivalently configured IBM PC and can use most existing IBM PC hardware options," the company said. ■

Softcon *(continued)*

Intellect for the PC will be designed to run on top of other applications, such as spreadsheets. AIC expects its price will be between $300 and $500.

AIC also plans to offer *Intellect Micro-to-Mainframe Link*, a product that would allow users to make requests in English for data from their corporations' giant processors. Downloaded data could be merged into applications programs on the PCs. The full software package will cost $17,500, with $250 for linking each additional PC. The mainframe in a system using this product must already be equipped with *Intellect*, of which only about 200 copies are currently installed.

Wide Field of Databases

Users today are also seeking greater flexibility in database packages—a need which Softword (maker of the *MultiMate* word processor) and Leading Edge responded to with their Softcon announcements. *MultiMate Data Manager* responds to the need of some users (such as in the large insurance company where *MultiMate* was conceived) to store long fields of information in files. The $350 *Data Manager* gives users color screens and highlighting, and menus to readily draw and develop screens and files. Softword also demonstrated its new Wang-like word processor for the PC*jr*.

Leading Edge, which markets products from several developers, also announced a database manager to fill the niche between the simpler packages (such as *pfs:File*) and the complex ones (such as *dBASE II*). *Nutshell* is an information manager that allows users to store files of almost any length, with each word being indexed and easily retrievable, according to Alan Albert, director of Nashoba Systems, Inc., the company that developed this hierarchical database package.

Other Highlights

Among other interesting products on the floor of the SuperDome:

- *Infoscope* from MicroStuf. Part database, part desk organizer, this list, file-creation, and sorting program uses color and natural language commands. Commands can be redefined, and files can be moved around in a working area several times the size of the monitor screen simply by referring to the file color (for example, "Move red here.") The program features focusing—any view of the file can be limited by field, record, or definition. *Infoscope* could become an important office tool both as a front end to *dBASE II* and other large database manager systems, and as a standalone information organizer.
- Products that might best be called thought organizers also popped up at Softcon. Fastware of East Orange, New Jersey has *Thor*, short for "Thought Organizer." It allows a harried executive to jot down thoughts as they occur and later link, expand, and sort them.
- *Thinktank* from Living Videotext of Palo Alto calls itself an "idea processor." It allows the user to build disjointed thoughts into full-fledged proposals. Thoughts are stored on levels of detail that the user can later wander back through to bolster or further organize his thoughts.
- *Professional BASIC* from Morgan Computing of Texas uses the full memory capacity of the PC and supports the 8087 co-processor. This expanded BASIC offers a window capacity that is truly remarkable. One window shows the BASIC code as it executes; the other window can display the results of each operation as it is performed by the program. *Professional BASIC* also allows dynamic syntax checking, labeled GOSUBS, cross-referencing, and setting breakpoints.

Psyched-out Software

- Software is also moving into interpersonal communications—training for sales negotions being a popular topic. Human Edge software of Palo Alto has a series of packages—*Sales Edge*, *Negotiation Edge*, and *Leadership Edge*—that simulate actual face-to-face human interaction.

In *Sales Edge*, for instance, the user builds a customer file of each person's attitudes and "hot spots," in addition to name, address, and biographical information. It allows the users to simulate a sales presentation to a "person" with characteristics of a particular customer.

- There are also self help, counseling-type packages on *Handling Relationship Problems*, *Coping With Stress*, *Handling Depressed Feelings*, and *Treating Sexual Problems*. By defining their feelings in words, persons using the packages can learn that they are probably not in as bad shape as they thought they were.

"People are generally trapped into these kinds of problems by what they are telling themselves," said Robert Reitman, Ph.D, a licensed psychotherapist with 25 years of practice. His company, Psycomp, in Woodland Hills, California, is offering the software for $89.95. He emphasized that the packages contain a warning that it's not for anyone with serious psychological problems. Reitman, like many exhibitors at this first SoftCon, was looking for both dealers and additional financial backers. ■

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For the beginning user, here is the volume to serve as the reference manual for the IBM PC. It is succinctly organized by BASIC programming statements so while programming, the user can go directly to the information he needs without confusion or delay. This one-of-a-kind guide contains the same information as the BASIC Reference Manual supplied with the IBM PC, rewritten especially for the layman. It presupposes no knowledge of BASIC and explains the materials supplied in the manual.

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New dBASE II is Network-Proof

Ashton-Tate's copy-protection makes networks pay full fare for software

BY JAMES LANGDELL

Local area networks seem like a good idea when several users want to make use of the same database at the same time. If you wanted to use *dBASE II* in such a network, there's been nothing in the way of copy-protection to stop you from writing an application with that program and running it on as many networked PCs as you like. Sure, Ashton-Tate would be unhappy about your use of its software on unlicensed stations—but you'd soon find reasons to regret it too.

Why? Because the original *dBASE II* was designed only for use on a single workstation. It doesn't provide protection against several users in the network "colliding" when they try making changes to the database simultaneously.

Multi-user Version

Ashton-Tate has announced a new product, *Multi-user dBASE II*, which makes it possible to create database systems that can run safely on a network of PCs. The basic package, priced at about $1,000, will allow up to four users on a network to use *dBASE II* simultaneously. Greater numbers of simultaneous *dBASE II* users can be accommodated by purchasing sets of upgrade software; each set, priced at about $500, will handle four more users. The total number of stations on a network can be greater than the number of simultaneous *dBASE II* users.

Multi-user dBASE II will be available on May 4. The initial version is designed to be used with PCs that are linked in a network using 3Com Corporation's EtherSeries hardware and software (for more information on 3Com's network see "Battle of the Network Stars" in *PC*, Volume 2 Number 6). Ashton-Tate is preparing versions for other networks, including Orchid's PCnet, Corvus' Omninet, and Novell's NetWare. By the end of this year, it will have versions for networks involving Apple's Lisa 2 computers, and eventually for the Macintosh as well.

Ashton-Tate's president and CEO David Cole said, "We'll concentrate on the main players with double-digit market shares. And if any company has a triple-digit share of a market, we're willing to give it our exclusive attention."

Collision Protection

Without collision protection in a network, one user might read a record while another user was changing it, resulting in the first user getting an inconsistent reading. Or two users could be changing a file at the same time—and the combination of their instructions might have serious, unpredictable effects on the database that probably wouldn't be detected at the time.

At the product announcement in Manhattan, *Multi-user dBASE II* was demonstrated through a simulated airline-ticket reservation system, run on a 3Com network of four Compaq Plus computers. The application program, written in *Multi-user dBASE II*, allowed several users to purchase tickets simultaneously while there were many tickets available for a flight. At a point when only a few tickets were still available, the program would start locking out other customers while one was ordering tickets. Thus, the program did not overbook the flight by confirming orders that

(continued)

Making BASIC Mind Its Millionths

Several readers sent in explanations and solutions in response to an item we printed about a peculiarity of the IBM PC's BASIC (see "What a Difference a Millionth Can Make" on page 55 in *PC*, Volume 3 Number 1). The original problem, found by reader Jack Kelly, was that running this statement:

PRINT INT(2.6*7−0.2)

produced the result 17 where you would have expected to see 18.

The problem is caused by the fact that single- and double-precision (noninteger) numbers are stored in binary form. When a decimal number is converted into a binary form, the binary version is sometimes an approximation, akin to the way a tidy fraction, like ⅔, becomes a messy, endlessly repeating decimal number, such as 0.66666666....

In the above BASIC statement, calculating 2.6*7 produces an approximate, binary result, slightly less than the even decimal answer of 18.2. When 0.2 is subtracted from the binary value, the result falls just short of 18. When the INT function is performed, it turns that value into an integer by trimming away the decimal portion and leaves the answer 17, a number that looks very wrong when it appears on the display.

Is there a way around the problem? Readers suggested a number of solutions, some of them right.

One suggestion was to avoid the round-off error by using pound signs (#) to call for double-precision values in the formula: INT(2.6#*7−0.2#). Unfortunately, this still gives the wrong answer of 17; it doesn't matter how many decimal places of accuracy you have if the answer is going to be wrong anyway.

Marcia Lipschutz used this method: Calculate(2.6*7−0.2) then convert this result into a string with STR$, then back into a number with VAL before finally putting that result through the INT function. Her method worked—the answer was 18—but it's a little baroque for everyday use.

Another reader, Tyler Folsom, found a way to use the INT function and get the effect of rounding rather than truncating. Just add 0.5 to any value before putting it through the INT function. This method works, but other readers pointed out that Microsoft BASIC can do the same thing without using the fudge factor.

Microsoft BASIC offers another function, CINT, that changes a precision number to an integer by rounding it off the way you'd do it yourself. Ryan Eren and Mark Cohn each suggested using CINT in place of INT, so values that get shaved in the course of binary arithmetic aren't gouged by truncation.

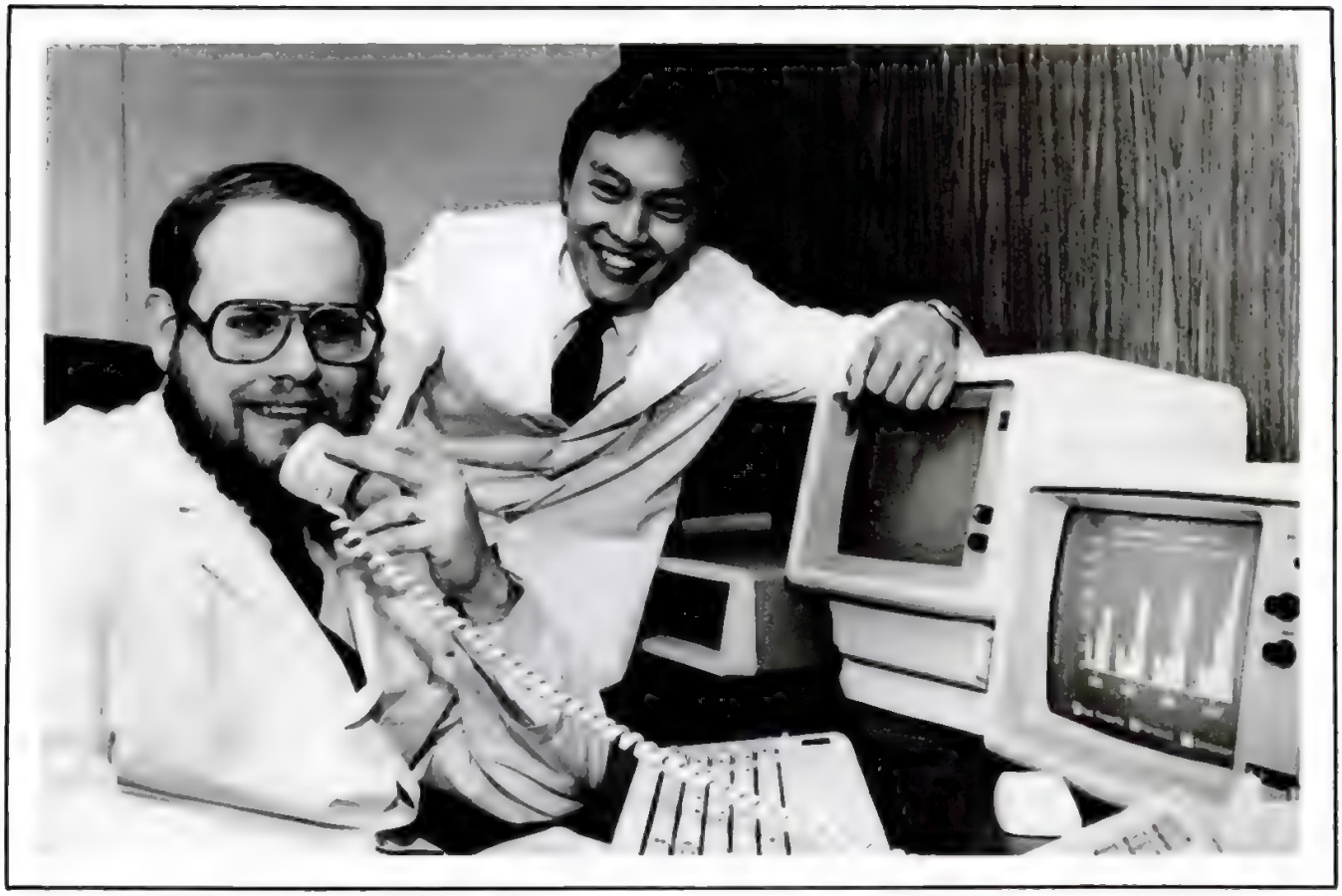
Some PC users might use the INT function for inappropriate operations because it's the only function of its kind provided by more primitive versions of BASIC. But CINT is available in all forms of the IBM PC's BASIC—even its Cassette BASIC. Microsoft BASIC also provides another variation on INT, the FIX function, which simply strips off the right-hand digits of both positive and negative numbers. ■

```
STORE t TO delay
DO WHILE delay
  FIND "&flt date"
  IF lock()
    STORE f TO delay
  ELSE
    @ 23,1 SAY '
    @ 23,10 SAY 'FLIGHT AVAILABILITY BEING UPDATED - PLEASE WAIT'
    DO WHILE  not  LOCK()
    ENDDO
    @ 23,1 SAY '
  ENDIF
ENDDO
STORE avail-VAL(seats) TO left
IF left >= 0
  REPL avail WITH left
  USE
  UNLOCK
```

Note the new LOCK and UNLOCK functions of *Multi-user dBASE II* in this excerpt from an applications program that handles airline ticket reservations.

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dBASE II *(continued)*

came simultaneously from different stations on the network.

At the climax of the demonstration, when only one ticket remained unsold, Ashton-Tate staffers at each Compaq in the network tried to press keys to order the ticket simultaneously. The result? Only the winner's screen confirmed the sale—the other three displayed a message that the ticket order could not be processed.

New Locking Functions

In *Multi-user dBASE II*, collision-protection is provided through three new functions: LOCK, LOCKNDX, and UNLOCK. LOCK is a logical function that you can use to restrict access to a record; you can get the effect of locking an entire file by following the convention of locking the first record in the file. The LOCKNDX function does the same for a *dBASE II* index. UNLOCK switches off the locking flags.

These new functions make no changes to the records and files themselves, so there should be no danger of making data permanently inaccessible by embedding a locking instruction.

Collision protection isn't provided automatically; the LOCK and UNLOCK functions must be written into each *Multi-user dBASE II* application. It's left to the programmer to decide when records should be locked and unlocked. For example, in a case where one user is revising a file, the programmer can decide whether to lock the file completely or to allow other users to read (but not change) the file.

The application programmer also must determine how to notify a user that the record he requested is temporarily locked. In some cases, it's best for the applications program to display a message, such as "Record in use—please wait." But if the record will be locked for only a few moments, the programmer might choose to give the locked-out user no message.

Making the Switch

Existing single-user applications written with *dBASE II* can be run on the new version. For collision-protection to be in effect, however, a programmer must add the new locking functions to the old program.

Ashton-Tate will continue to sell and support the single-user version of *dBASE II*. Present authorized users of *dBASE II* can obtain copies of the multi-user version by paying the difference between the list prices of the two products—about $300. The exchange should be handled through the customer's original dealer. Ashton-Tate won't ask customers to turn in their old disks. Aside from the new multi-user capabilities, no enhancements have been added this time around.

Copy Protection

Ashton-Tate is satisfied that its copy-protection system, used for the first time in *Multi-user dBASE II*, is an effective way for a software manufacturer to offer a product that can be run on a network. The company says this protection will assure that the program won't be in easy reach of unlicensed users, but without inconveniencing legitimate users.

Ashton-Tate will make this copy-protection technology available to developers of *dBASE II Runtime* programs. The software-protection system was developed by Vault Corporation of Westlake Village, California. Ashton-Tate holds 20 percent of Vault's stock, and has options on more.

Why is 3Com's EtherSeries the first network to run *Multi-User dBASE II*? For one thing, this network offers a widely used network standard, Ethernet, for the most popular personal computer, the IBM PC. Also, 3Com's staff was quick to cooperate with Ashton-Tate in the development process. It didn't hurt that each company was already familiar with the other's product. Ashton-Tate uses an EtherSeries network in-house, and 3Com makes frequent use of *dBASE II*.

For more information, contact Ashton-Tate (10150 West Jefferson Blvd., Culver City, CA 92030, (213) 204-5570) or 3Com Corporation (1390 Shorebird Way, P.O. Box 7390, Mountain View, CA 94039, (415) 961-9602). ■

New IBM Products Tangential to PC

3270-PC graphics and a desktop 9002 that runs Xenix

IBM announced some new products that relate to two of the PC's workstation stablemates: the CS9000 and 3270-PC.

The latest addition to IBM Information Systems Group's CS9000 line (see "PC's Powerful Cousin: The IBM CS9000" in *PC*, Volume 3 Number 5) is the 9002 desktop computer. This new model is smaller than the original System 9000. The 9002's separate keyboard combines a PC-style keyboard with an area for data entry with 57 user-definable, membrane-covered keys, similar to those found on the main unit of the 9000. Its graphics screen has 768 by 480 resolution. Like the larger unit, the 9002 can handle 5.2 megabytes of RAM and up to four of each of these types of disk drives: 5¼ inch diskette, 8 inch diskette, and 10-megabyte hard disk.

IBM also confirmed that it would be supplying Xenix—Microsoft's derivation of AT&T's Unix—as an optional operating system for the 9000 line. When the 9002 is available in the second quarter of 1984, it will be equipped with the 9000's standard CSOS operating system, but Xenix will be available as well. Xenix allows up to four individuals to use the 9002 at the same time, with three at attached terminals.

The base price for the 9002 desktop computer, with 128K RAM, system unit, display, keyboard, and CSOS (no disk drives or printer) is $6,495. One-time license charges for Xenix and languages are: $995 for the Xenix operating system, $595 each for Pascal and FORTRAN, and $1,250 for RM/COBOL.

Graphics for 3270-PC

IBM also announced graphics hardware and software for the 3270-PC. Adapter cards for that computer give it business graphics capabilities, including producing pie charts and bar graphs. An adapter card for the PC-session's all-points-addressable graphics is $550, and a card that produces host-style graphics is $800.

With new image viewing software, the 3270-PC and other 3270-typestations can display and store images of documents, such as line drawings, printed forms, and signed letters, in a digitized form. The input device used with this software is the IBM 8815, also known as the Scanmaster I, priced at $11,880. The one-time license charge for the 3270-PC's image viewing software is $5,400.



The 3270-PC's monitor displays a drawing that had been digitized by the IBM Scanmaster I.

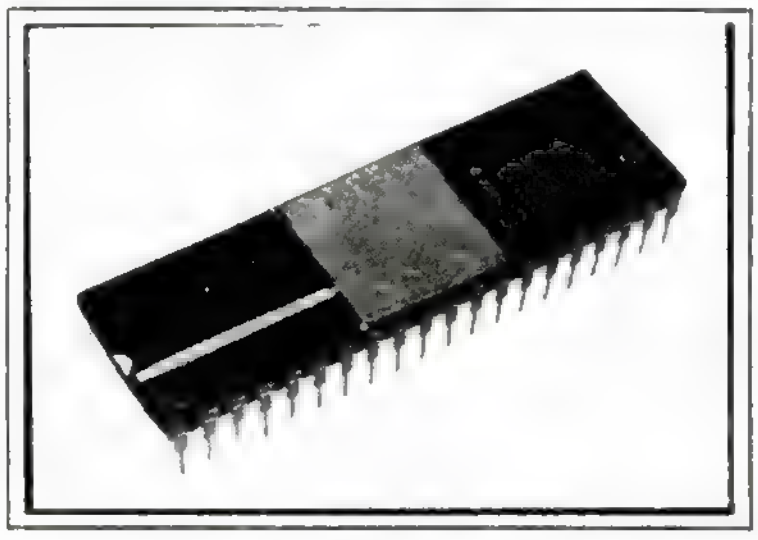
No PC Shocks

None of these announcements has a direct impact on the PC line. All of them come from IBM divisions other than the PC's home in Boca Raton. Even the news of another IBM product adopting a form of Unix—even one made by Microsoft—gives no clear clue as to IBM's plans about operating systems for its personal computers. According to Johnthan Art, a financial analyst for the Gartner Group of Stamford, Connecticut, the IBM Information Systems Group, which produces the 9000 line, "has its own markets. You have to look elsewhere, where the corporate thrust involves workstations, to see where IBM is going to go." ■

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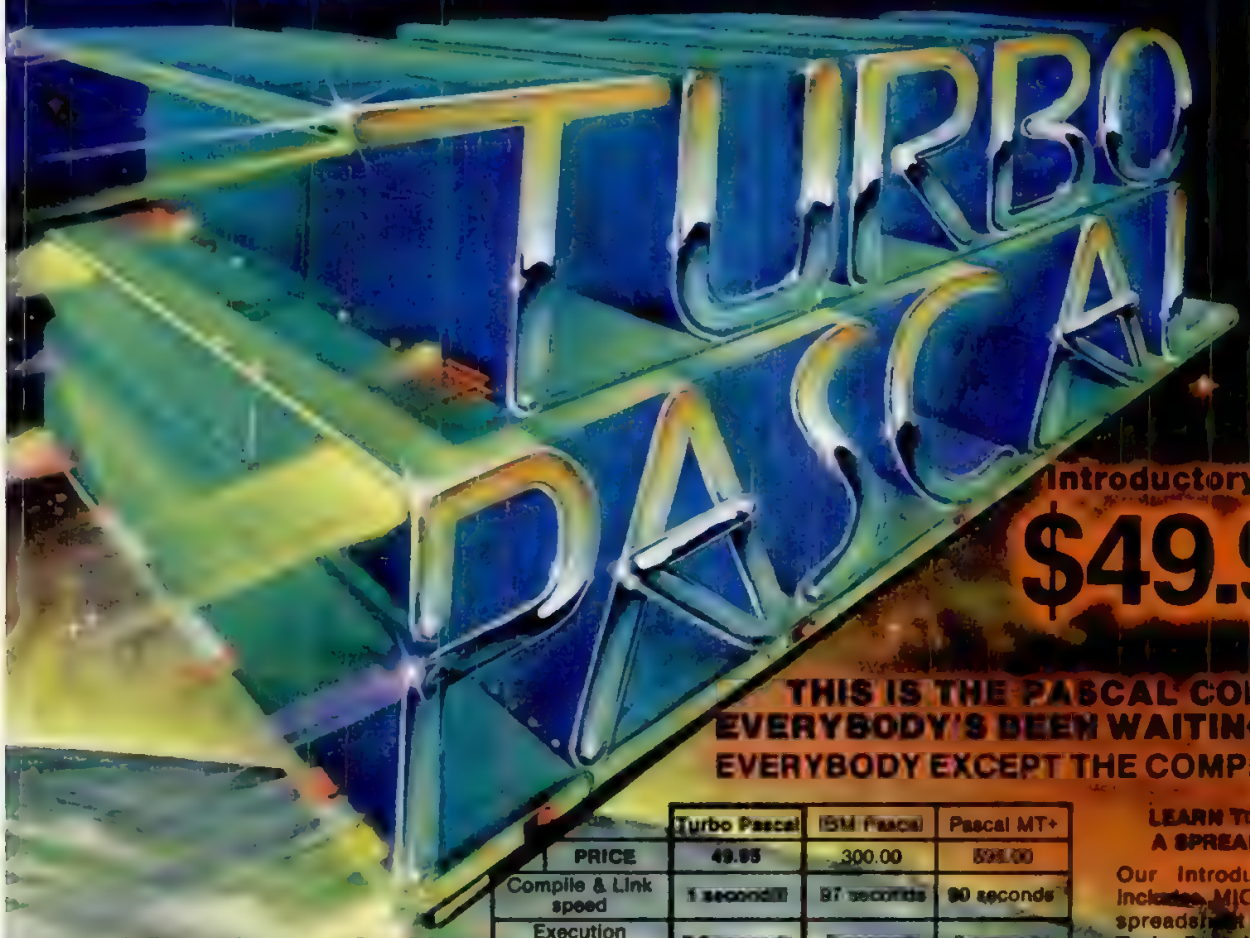
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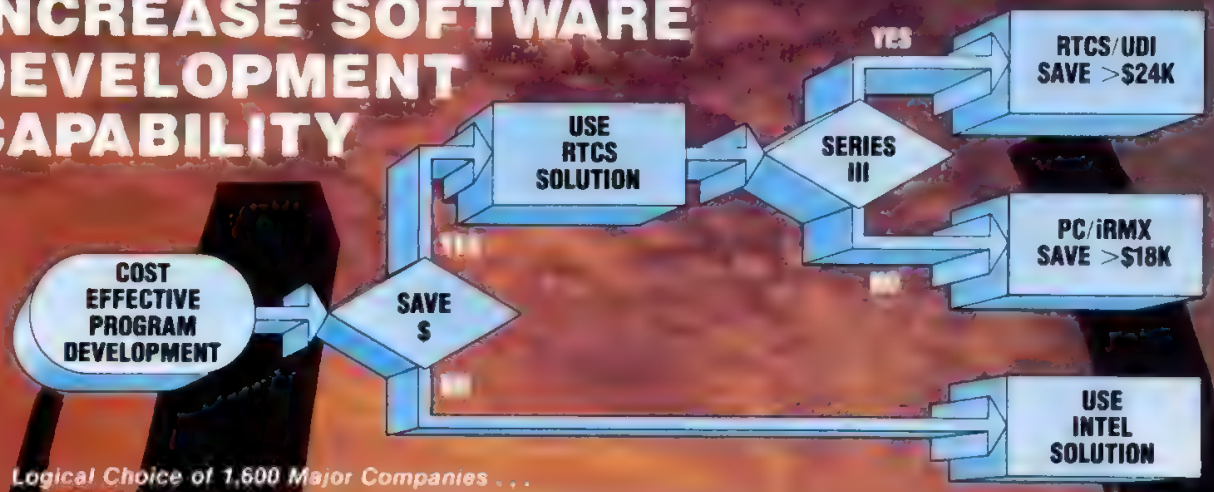
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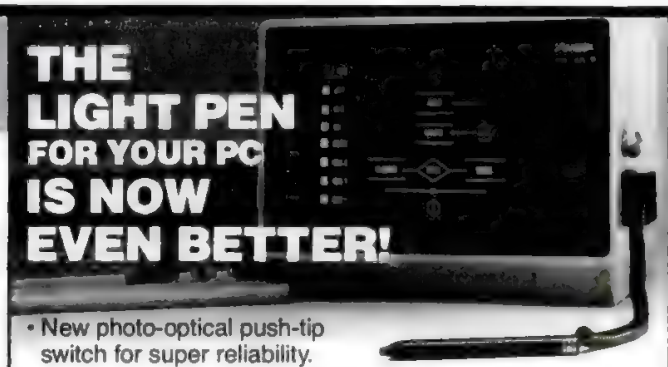
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Growing Demand Spurs Mainframe-to-Micro Links

Executives fear for data security, and software developers bemoan a lack of hardware standards—but "everyone wants links."

BY KAREN COOK

Those corporate Goliaths, the mainframes, are crumbling under the assault of millions of microcomputers. Initially purchased by individual executives tired of waiting for data to be churned out by overcrowded mainframes, modest micros have become increasingly powerful and so plentiful that they are fragmenting entire corporate data processing systems, experts say.

As a result, data processing (DP) directors—once disdainful of the small machines—are now begging for ways to integrate them with mainframe systems. "Micros-to-mainframe links are a natural development," says Curt Monash, software analyst for Paine Webber Mitchell Hutchins. "Nobody knows what they will do when they have them, but everybody wants them," he adds.

Despite demand, though, micro-to-mainframe connective programs—which might loosely be called "bridge" software—have been slow coming to market. "Most of the announced products are vaporware," comments one software analyst, who says he has seen two versions of one company's product, a "canned demo" of another, and "nothing else."

"Development of mainframe-micro connections is going a lot slower than the advertising would indicate," concurs R. L. Pitcher, director of communications and office automation for Arthur D. Little in Cambridge, Massachusetts.

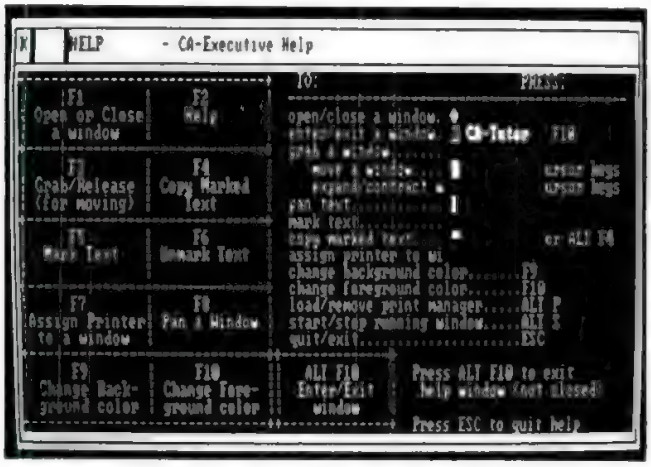
The problem requires a brief and oversimplified history: decades ago, IBM, Sperry, Burroughs and a host of other companies installed the first mainframe computers—ideal for storing and analyzing all sorts of corporate data.

Unfortunately, only a few specialists—the data processing managers and the programmers—understood how mainframes worked. For nontechnical company employees, there was no easy way to get needed information out of the company data banks. If you wanted a list of all the names of insurance policy-holders whose last names begin with the letter *D*, for example, you requested the information from the data processing manager, who in turn assigned a programmer to devise a program specifically asking the mainframe to divulge *D* information.

The programmer would work at a dumb terminal, which sent messages to and from host mainframes, but—unlike microcomputers—had no power to execute the programs they displayed. The completed D program would be relayed from the terminal to the mainframe, to be added to the list of other programs waiting to be run. If there were no delays, the desired list would be extracted from the data bank and sent to the terminal—assuming, that is, that there were no fatal bugs in the program. With delays and complications, the programmer—and hence the end user—could wait for days to get his or her list of policy holders.

In the late seventies, personal computers were born. Only one person at a time could use them; they fit neatly on desk tops; and they packed as much power as some early mainframes. Noncomputer executives, eager to improve their productivity by avoiding the lines for information at overloaded mainframes, ran out to buy the new machines.

Because of their reasonable cost, personal computers were accessible to employees at all levels of corporate life. Using easily understood, pretested commercial software packages, employees could turn raw data into operating results quickly and then display those results in spreadsheets and graphs. They didn't need unresponsive central data processing departments after all.



The CA-Executive mainframe link uses windows and help screens at the micro end.

But micro and mainframe functions could not remain independent of each other for long. As micro users grew more sophisticated, they wanted fast, direct access to those central corporate data files. Rather than getting printouts of mainframe data, then wasting hours typing pages of statistics into their *1-2-3* or *VisiCalc* financial packages, executives wanted to use data from the company mainframe immediately—after direct electronic transmissions from the central data source to the PC's memory banks.

Demand for Links

This widespread desire for direct access to mainframe data has been reinforced by corporate controllers, eager to coordinate the expanding computer networks. Their fear is that the micro-induced decentralization of computing has created inconsistencies: Various company units may use different financial models so that their results can't be compared, for example. Mistakes may occur when figures originally generated on micros are rekeyed into the mainframe. DP managers are reluctant to risk letting micros interfere with vital, confidential corporate data, but also want to regain control of company computing power.

Not surprisingly, the PC users are winning—demand for connections between micros and big systems has grown rapidly in the last year. Meeting this demand won't be easy.

The problem of joining micros and mainframes is far more complex than most corporate computer users initially imagined. Micros and mainframes are as far apart in hardware compatibility as they are in size. Not only are the venerable IBM mainframes and their complicated architecture not made to communicate with micros, they are also incompatible with other IBM equipment—from word processors to PCs to minicomputers.

"Developing integrated architecture could take years—it may not happen in our lifetime," says Scott Smith, software analyst for the Gartner

(continued)

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Mainframes *(continued)*
Group, a Stamford, Connecticut, research firm.

Software Bridges Gap

In the meantime, the only real substitute for hardware compatibility is sophisticated software that can convert one machine's code into a generic form that can be transferred to another computer. Once transferred, that generic code must be translated into usable, specific code by the receiving computer's software. (This roundabout method is already used to move software from one incompatible microcomputer to another: for example, IBM PC users can buy programs to convert Apple software into a usable form.)

Writing software to transfer data from mainframes to micros is particularly difficult. Some micros may be linked to mainframes directly, by cables, but many others can be joined only by modems and telephone lines. Boiling down elaborate mainframe communications protocols into simple formats that can be transmitted over low-baud phone lines and received by micros is a daunting task.

David Tory, vice-president for planning at Computer Associates, Inc., a Jericho, New York mainframe software giant that has developed a micro-to-mainframe package, says software developers have been hampered by the lack of any firm communications standards among machines. "If you're talking mainframes, you're talking IBM, and right now IBM has several standards on its various machines. Once IBM comes up with standard architecture and communications protocol and a local area network (LAN), everyone can make compatible products that will hook simply into complex mainframe systems. Then the whole business will explode," Tory predicts. (IBM introduced a "cluster"-style networking facility when it unveiled its portable PC, but this appears to be an interim PC-to-PC link, rather than the long-awaited PC-to-mainframe network announcement.)

In addition to the basic question of feasibility of software, another micro-to-mainframe connection question is how eagerly DP managers will receive the new products as they actually become available. "People aren't rushing into it, but they are talking about it. DP managers worry that data security will be threatened if lots of micros have direct access, so they've been hesitant about implementing links," says Smith at the Gartner Group.

Also, DP managers worry that unsophisticated users may not use corporate data correctly: "They may think they are downloading pure data, but in fact several calculations may already have been performed in the process of entering figures into the main system," warns Pitcher of Arthur D. Little.

Even if they endorse connections, office systems managers are cautious about installing them: "I don't want to invest a lot of money putting in a system when IBM could change everything in 3 years," says Pitcher. "We need standards."

Even so, Smith thinks that 1984 will be "the year of implementation. There are terminal emulation packages in use, but the number of intelligent links installed is really very small," he says.

Mainframe Vendors Lead

Many of the impending bridge programs will be sold by old-line mainframe software firms already expert in marketing expensive software to large corporations.

● *Executive Peachpack II* is a bridge program from Atlanta's Management Science America (MSA), one of the world's largest software distributors. The *Executive Peachpak II* *(continued)*

Slowness Is Par on the Corporate Mainframe Links

BY LORRAINE KING

NEW YORK—When the Fortune 1000 corporations supplied their professional employees with personal computers—usually PCs—they rarely considered the long-term consequences. Most saw the personal computer as a way of bypassing an unresponsive central data processing department, and a few bought personal computers simply to follow a competitor's suit. Now, however, these corporations are finding that personal computers are the hors d'oeuvre to a costly banquet of hardware and software purchases.

"In the future a lot of companies are going to regret the ease with which they bought personal computers," says Anthony Pagoto, senior vice-president of Lewco Securities of New York, which provides data processing services to Wertheim & Company and to Lehman Brothers Kuhn Loeb Inc. "I anticipate that every PC added to a firm is one step nearer to a problem in the future when the user will demand access to the mainframe."

Unplanned Micros

Computer industry analysts and data processing professionals report that many corporations have bought personal computers without planning how they should be applied and without being aware of the technical problems to be solved before they can be linked to a mainframe. "You are swayed because everyone else is doing it, so you have to do it. There's no real upfront plan," says R.L. Pitcher, director of office automation and communications services at Arthur D. Little Inc. of Cambridge, Massachusetts. "People initially don't accept that they have to go to the mainframe. They have to make mistakes to learn."

Many personal computer users were attracted to PCs precisely because they were independent of the big mainframes—and physically separated. But now they increasingly may have to access their big centralized databases for such valid reasons as collating financial records for input to their modeling system, or updating a corporate master file of stocks purchased on behalf of a client. Each access represents another demand on the resources of a mainframe that may already be operating fully stretched during peak office hours.

Another worry for keepers of the big systems is that a personal computer user can now sift through and corrupt sensitive corporate databases more easily than on a simple CRT terminal. Corporate information is even less secure against employee error than against an external "invader" who has to put a lot of effort into breaking password security systems.

"Most security systems were designed with the idea that access would only be through a dumb terminal, not through a sophisticated personal computer," says Rick Richardson, national director of micro technology at Arthur Young and Company, also in New York. "Every company is now having to face this problem and think through security issues before allowing their own PCs access."

Richardson has encouraged the spread of 700 various personal computers at Arthur Young, but he still denies them mainframe access. "We are requesting ideas to try it out by mid-1984," he says.

A similar policy has been adopted by Pitcher at Arthur D. Little, where only occasional dial-up of the mainframe is allowed, but he expects pressure on central computing resources to boil over in 1984. "Many of these applications will migrate back to the mainframe, which will act as a file-server. We will have to have enormous disk capacity, a front-end communication network, and an additional *(continued)*



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Mainframes *(continued)*

package builds on IBM's concept of the 3270 terminal, IBM's original dumb window onto the data stored in IBM mainframes. *Peachpak* uses 3270 terminal communications protocols that allow mainframes to send data to the microcomputer as if it were a terminal. Rather than writing programs to extract data, as they would on a terminal, users can select a desired type of information ("approved plan amounts," for example) simply by making a selection from one of *Peachpak's* on-screen menus. Mainframe data, which is downloaded onto a disk, cannot be used universally. It works only within *Peachpak's* integrated software package (including products from Peachtree Software, an MSA subsidiary) or with designated programs like *1-2-3* or *VisiCalc*.

- *CA-Executive*, from Computer Associates, Inc., delivers mainframe data to an integrated microcomputer applications package with a mainframe communications product called *CA-LINK*. According to Computer Associates, *CA-LINK* duplicates 3270 protocols with a standard RS232 interface and a specially designed data transfer protocol called DXP. *CA-Link* transfers data into the micro's *CA-DBMS*, a relational data base management system. From there, data can be moved around into windows that display CA's integrated word processing, graphics, or spreadsheet programs.

CA-Executive also features a window for PC-DOS programs. Users can write selected information from the integrated programs into an electronic notepad window, and from there incorporate them into PC-DOS programs.

Finally, *CA-Executive* allows users to upload newly manipulated data to the mainframe—although not without supervision. According to *CA-Executive* publicity, DP managers can "determine how, when, and by whom mainframe data will be accessed and returned, [so that] invalid data cannot be transmitted back via the link."

- Cullinet Software, Inc, a long-established systems software vendor based in Westwood, Massachusetts, has taken a slightly different approach. Rather than allowing micros direct access to information in the mainframe data bank, Cullinet's *Personal Computer System* software networks PCs to a Cullinet mainframe product called *Information Database*. *Information Database* stores daily summaries of the corporate information processed the day before and stored elsewhere on the mainframe. Like *CA-Executive* and *Peachpak*, Cullinet's PC software downloads data into an integrated microcomputer software package, then reloads selected files to the *Information Database*.

Micro Scramble

Makers of financial software for the PC are scrambling to be sure that their products don't get left out when the mainframe software vendors start reaching down to the micros.

- Lotus Development Corp., of Cambridge, Massachusetts, has been actively seeking mainframe software partners. In addition to its inclusion in the *Peachpak* and *CA-Executive* packages, Lotus has signed a development agreement with McCormack & Dodge, a Dun & Bradstreet company that sells financial applications software for big systems. McCormack & Dodge claims its product allows data that has been run through *1-2-3* or the new *Symphony* financial applications packages on the micro to be fed back into the mainframe.

- VisiCorp, based in San Jose, California, signed a joint marketing and development agreement with Informatics General Corp., a 21-year-old developer of applications software for IBM mainframes. The two companies have developed a two-part product: *VisiAnswer* runs on the PC and formats the request to the mainframe database and dumps the received information into micro software programs for local processing, while *Answer/DB* runs on the mainframe and pulls data from the mainframe database and downloads it to *VisiAnswer* on the micro. ■

Speaking of Computers: Not till it freezes

"Will Apple ever offer an IBM-compatible product? Some industry watchers think so, especially if the Mac attack fails, but Goldberg says, 'I think they'll make refrigerators first.'"

Fortune, February 20, 1984. Aaron Goldberg is an analyst with International Data Corporation in Framingham, Massachusetts. ■

Slow is Par *(continued)*

or upgraded mainframe by next year." Although Pitcher is currently considering enlarging his mainframe, he does not view this method as an ideal solution to the problem of networking personal computers.

"At least 5,000 mainframe complexes have problems," estimates Peter Lawber, senior market analyst with The Yankee Group of Boston. His colleague at Yankee, Chris Christiansen, adds, "To the ordinary user (the personal computer) is a pleasant surprise. To the information systems budget, it is a very unpleasant surprise."

Software Needed

The worst obstruction to linking personal computers into a mainframe is the absence of tested, reliable software. Even when a corporation accepts the unforeseen cost of trying additional central hardware, there is no standard software that gives data security, constant availability, and fast response time from the mainframe, and which is friendly to a professional user. And the few software development engineers with experience in the micro-to-mainframe interface command very high fees.

"There is no easy, low-risk, cost-effective technique of linking PCs in a network," says Carl Longnecker, a partner in Arthur Andersen's Management Information Division in New York. "We are looking at version zero products. All our solutions now are short-term because of the lack of mature hardware and software products."

"The interface software is not there for the casual user who cannot be expected to learn programming," adds Richardson of Arthur Young. ■

Sixty Seconds over Cupertino



Attack is a game that might live up to Steve Jobs' worst nightmares. It's a shoot-'em-up, written in BASIC, that IBM PC users have passed along as a piece of public-domain software. What makes this game different is its object.

"Your mission is to attack and destroy the Apple Computer manufacturing plant. You are allotted 35 bombs and 60 lasers."

We got our copy of *Attack* from Michael Huttner, who said the version he received was a little buggy, so he tinkered with the program and then complied it to make it run faster. Copies of *Attack* should be available through the public-domain software services of most IBM PC user groups. Also, the PC Software Interest Group (1556 Halford Ave., Suite 130, Santa Clara, CA 95051) offers *Attack* on its Disk No. 37.

There's no identification of the author of this program, neither on its screens nor in the BASIC source code. The title screen has the heading, "IBM General Utility Programs," but we doubt that Big Blue really set up this shooting gallery to train its sales forces. If you'd rather have another target for your attack, you only have to change the names in about a half dozen lines of code in the program.

—James Langdell



ATRON Announces A State of the Art Advance in Software Debugging—PC Probe

PROGRAMMERS AND MANAGERS know that finding bugs during new product development and over the entire product life cycle adds up to a significant portion of total product development cost and support time. Investing in the right debugging tools will greatly improve time to market as well as minimize development cost. Atron Corp has the right debugging tools for the PC environment. These are

1) PC PROBE
2) SOFTWARE PROBE
3) PERFORMANCE ANALYZER

PC PROBE plugs into a PC or compatible. It is a total system debugger with features like:

Real Time Trace
Program flow is saved in trace memory while running at full speed. PC PROBE can display trace data as high level language line numbers, procedure names etc. — or as 8088 instructions. In addition, DMA cycles, interrupt lines and external logic probes can be traced. Real time trace answers the question "How did I get here"?

Memory Protection
What good is a debugger that can be wiped out by an undebugged program? PROBE software is write protected and can't be changed.

Hardware Breakpoints
The PC PROBE has 8 breakpoints and can trap conditions such as instruction execution, read, write, IO, DMA, interrupt, or external logic probes. Breakpoints can also be set on ranges of address or data — symbolically too!

Enhanced Human Interface
The PC PROBE designers know the importance of EASE OF USE. The PC PROBE interface has a menu window which displays the syntax of each command — so you never have to remember how a command works. It also recalls the previous invocation of each command to save tedious typing — and tedious thinking!

Symbolic Debugging
Avoid the tedium of sifting through link maps to find out where things are. The PC PROBE uses your program symbols.

Macro Commands
Why be limited by a fixed set of debugging commands? PC PROBE lets you create your own powerful macro commands with parameter passing, nesting, LOOPING and IF/THEN/ELSE control.

ANNOUNCING SOFTWARE PROBE

The same great software used on PC PROBE is now available separately as SOFTWARE PROBE —

ONLY $295

Software probe is the only software debugger available which provides a hardware reset and break box for program crash recovery. What good is a software debugger if you can't get control of run away programs?

PERFORMANCE ANALYZER
How do you find time critical program problems or know where to start performance tuning your software? Get Atron's new Software Performance and Timing Analyzer. Then you can display histograms of how your programs run — by time or by events. You can perform many different timing measurements.

Atron has many happy customers who have made critical product schedules because of PC PROBE. Why waste time on primitive debugging techniques? — Call us today and ask for your 12-page data sheet. Manuals also available for $25.

atron

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CIRCLE 156 ON READER SERVICE CARD

PRODUCT REVIEW

More Refinement for Your Processed Words

BY BIL. ALVERNAZ

Punctuation + Style, Version 1.21
Oasis Systems
2765 Reynard Way
San Diego, CA 92103
(619) 222-1153
List Price: $125
Requires: 64K RAM, one single or double-sided disk drive (two disk drives recommended).

If you write any of the following phrases, then you're a candidate for using *Punctuation + Style:*

- at this time
- in order to
- in the last analysis
- has proved itself to be
- along the lines of
- in a number of cases

The program hunts down 700 of these "writing roadblocks." You can easily add other grating phrases to the list, or omit those you can't live without. The program is remarkable in that it not only flags the problem phrases, it suggests alternative words. After using this program for a while, your writing style definitely improves.

The writing roadblocks are listed in the exceptionally well-designed manual under eight categories: awkward, erroneous, folksy, muddy, pompous, redundant, and wordy phrases, and cliches.

Eliminating writing roadblocks is just part of the "one-two" punch packed on this single-sided disk.

Beyond Spelling Checking

Spelling checker programs usually do just one thing—find spelling errors. As a rule, they can't catch repeated words, missing periods at the end of sentences, unclosed quotation marks, or words with mixed upper- and lower-case letters (for example, CAliforNia). *Punctuation + Style* takes care of all of those problems and more.

WordStar users will appreciate this program's way of catching unmatched *WordStar* control characters for such things as boldfacing and underlining. *Punctuation + Style* is preset for *WordStar*, but this feature can be redefined for use with other word processing programs, such as *Perfect Writer, Spellbinder,* and *Magic Wand*.

Punctuation + Style displays whatever problem has been flagged. It not only points to what is wrong, it tells you what the problem is. Then, if you choose to mark the phrase or word, the program will place brackets around it in your file. You also can ignore the flag. The problems you have marked can be found by using a global search command.

Passive Verbs Helped

Punctuation + Style also checks for passive voice. Most books about writing advise using active voice, but many people use passive voice as an easy way to sound more objective. Active verbs are usually clearer and more to the point than passive verbs. The program would urge you to change a sentence like "The ball was kicked by John" to "John kicked the ball."

Punctuation + Style is a unique program for the PC, and it is based on research by its author, Wayne Holder. He credits two works as strong inspirations in developing this program: Richard Lanham's book *Revising Prose* (Scribner's, New York 1979) and Bell Telephone Laboratories' series of programs called "The Writer's Workbench."

Wayne Holder packed so much useful information into this software, you may start to believe that only magic could make a program that can improve your writing in such a painless way. ■



Wayne Holder and the Sweet Spell of Success

Oasis Systems is best known for its word processing software. But when Wayne Holder started the company in 1978, its first products were a light pen for the TRS-80, a real-time monitor for mainframes, and a peripheral switching box for microcomputers.

One evening in 1981, Holder started working on a program to check spelling—something that could help his wife, Nancy, in her work as a writer. Over the next 4 months, he went through her manuscripts, put together a dictionary, and programmed a functioning spelling checker. His wife loved it. Some of his friends saw it, told him it looked like a winner, and wanted copies for themselves.

Wayne added a few more features, placed a few ads, bought a rubber stamp with his return address, and started marketing a program that he ultimately named the *The Word Plus*.

Since then, he's sold nearly 100,000 copies of *The Word Plus*. Holder wants to develop an extensive package of what he calls "writer aids." His second step towards that goal, *Punctuation + Style*, is proving just as successful as his first program. Since it was introduced last fall, over 10,000 copies have been sold. *Punctuation + Style* now accounts for about one-third of Oasis Systems' sales volume.

According to Holder, *The Word Plus* has sold "pretty much across the board" to different types of users. The biggest groups of customers for the new program, however, have been the professional writers and universities and colleges.

(continued)

All the Bugs That's Fit to Print



It may be hard to find a magazine more tightly targeted to its readership than *VAX/RSTS Professional*, a publication aimed at users of Digital Equipment Corporation's larger machines. Its narrow focus hasn't hurt the editors' sense of humor, though. The disclaimer just below the masthead reads:

"All programs published in the *VAX/RSTS Professional* are warranteed to perform no useful function. They are guaranteed to contain bugs. They are designed to get you thinking. They are intended to entertain. They are published on the premise that it is better to spread people's best efforts around, even if there is an occasional problem. If you use them, make them your own and you will not go wrong."

Wish we'd thought of that.

—Bill Machrone

Holder *(continued)*

Holder got his start with computers in the Navy, where he worked with mainframes. Eight years ago he spent $600 on a kit from IMSAI and built a computer with a mere 256 bytes of RAM—the same computer as "the one popularized in the movie *War Games*," Holder said. Today, he does most of his work on a Kaypro 10.

Oasis Systems plans to release foreign-language editions of *The Word Plus*. Versions in German, Swedish, Norwegian, and Danish are being worked on. As other markets develop, Spanish, Italian, and French ("The most difficult one of all," according to Holder) versions will be prepared.

What's next from Wayne Holder's workshop? One new program is unlike any previous Oasis product. Called *SunDog*, it's an adventure game with brilliantly colored graphics that was written in Pascal by Bruce Webster. While playing it, you are a trader who travels to dozens of planets in a space craft, searching for your kidnapped father. *SunDog* will be available first in a version for the Apple IIe, but Holder promises that a version for the IBM PC will follow.

While it might not help anyone write better, *SunDog* seems to have the same quality and ingenuity found in Oasis Systems' other products.

—Bil. Alvernaz

Calendar of Events

DATE	EVENT	COMMENT	LOCATION	CONTACT
April 5-7	COMDEX/Winter	Hardware and software for dealers and retailers.	Los Angeles Convention Center Los Angeles, CA	The Interface Group 300 First Ave. Needham, MA 02194 (800) 325-3330 (617) 449-6600
April 9-11	National Online Meeting	Presentations for users of online information sources.	Sheraton Centre Hotel New York, NY	Learned Information, Inc. 143 Old Marlton Pike Medford, NJ 08055 (609) 654-6266
April 17-19	Federal DP Expo	Hardware and software aimed at MIS managers. Emphasis on integrating desktop computers to mainframes.	Washington Convention Center Washington, DC	The Interface Group See above
May 3-6	Personal Computer Userfest	Featuring Apple and IBM PC computers and compatibles.	O'Hare Exposition Center Chicago, IL	Northeast Expositions 822 Boylston St. Chestnut Hill, MA 02167 (800) 343-2222 (617) 739-2000
May 22-25	COMDEX/Spring	Hardware, software, and accessories for dealers and retailers.	Georgia World Congress, Atlanta Apparel Mart, and Atlanta Merchandise Mart Atlanta, GA	The Interface Group See above
May 22-26	MICRO-EXPO	International hardware and software trade show.	Palais des Congres Paris, France	In U.S.: MICRO-EXPO 2344 Sixth St. Berkeley, CA 94710 (800) 848-8233 (415) 227-2346
June 12-14	Advanced Manufacturing Systems Exposition & Conference	Information systems and automated production systems.	McCormick Place Chicago, IL	AMS 84 708 Third Ave. New York, NY 10017 (212) 370-1100
June 26-28	PCExpo	IBM PC and compatible trade show.	New York Coliseum New York, NY	PCExpo 333 Sylvan Ave. Englewood Cliffs, NJ 07632



If you're like most people, you naturally assume that IBM personal computers are so advanced they practically run themselves. Plug it in and off it goes. Solving problems, making work easy, counting new profits while you drift off with headphones and Vivaldi.

Until you own one. And a fistful of software. Soon it becomes a battlefield of tedious typing, conflicting commands, picky protocols.

Grasp victory. Get ProKey.™

ProKey is a unique software program that actually operates your favorite software including WordStar, Visicalc, Lotus 1-2-3, dBase II and most others.

With ProKey you can recall frequently used phrases, headings, names, entire scripts with a single stroke. Accurately.

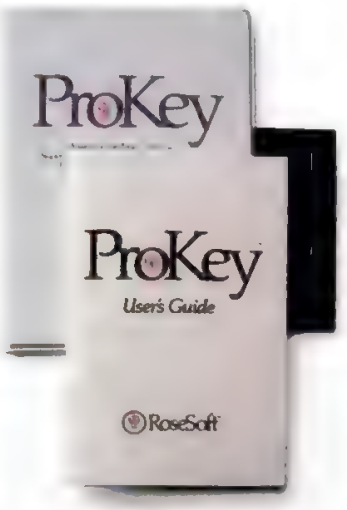
ProKey memorizes mindlessly complicated command sequences and, at the touch of a key, executes them automatically. Instantly.

Standardize a plethora of protocols with one simple personal command. Painlessly.

As you gain experience and confidence, ProKey grows with you. You'll be able to customize off-the-shelf software to your own personal or business requirements. Ultimately you'll use ProKey as a "super command center" operating your word processor, spreadsheet, database and graphics programs together to create a totally unique, incredibly productive system.

ProKey is available at most Computerland stores and wherever fine software is sold.

Once you use ProKey you'll wonder how you ever faced your IBM alone.



RoseSoft, Inc.
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Suite 601,
Seattle, WA 98105
(206) 524-2350

To run ProKey, you'll need an IBM Personal Computer or workalike, DOS (any version, including 2.0), and 64K of RAM (WordStar requires 96K).

WordStar, VisiCalc, Lotus 1-2-3 and dBase II are trademarks, respectively, of Micro Pro, Visicorp, Lotus and Ashton-Tate

CIRCLE 438 ON READER SERVICE CARD

PRODUCT REVIEW

Happiness Is a Warm Disk

BY TOM HOUSTON

Happy I
Milon, Inc.
24 Wyckoff Ave.
Waldwick, NJ 07463
(201) 447-9407
List Price: Not available
Requires: 64K RAM, PC-DOS 1.1 or 2.0

Twenty years ago, the writer C. P. Snow elaborated his theory of "two cultures" by asserting that the intellectual life of industrial societies had become polarized between two conflicting sets of cultural values. On the one hand were champions of traditional humanistic values, trained in the liberal arts, and concerned with intangible, "spiritual" values. The opposing camp was led by scientists and engineers, the other heirs of the Renaissance. Each offered a perspective on the direction that our civilization should take in such matters as education, social policy, and watching TV.

This old quarrel is scarcely remembered now. Since then it seems that the prestige of technology has increased, while arts and letters are in decline. Compared to earlier generations, we seem less capable of using philosophy to organize and maintain our mental lives.

For many Americans, "spiritual" matters are left to such specialists as psychiatrists and radio evangelists. Our attempts to get in touch with ourselves are through human potential seminars, self-improvement books, or jogging.

Among the factors contributing both to the triumph of Snow's technological values and to our widespread dependency on external sources for psychological equilibrium, some moralists would prominently list the computer.

And yet, computers were designed to set free the human spirit. By assigning to machines most of the drudgery of information processing, our leisure time should increase through their power, speed, and productivity. However, beyond the use of computer games to combat boredom, not much effort has been made to apply computers directly in solving our personal psychological problems.

A Program for Happiness

An interesting exception is a software package, created by Michael J. Lonergan, called *Happy I*. The cover of the manual is adorned with a paradox (a blue "happy face") and the program's subtitle, "How to Take Control of Your Own Happiness and Some Other Thoughts." The next 76 pages describe in cheerful detail the author's recommended technique.

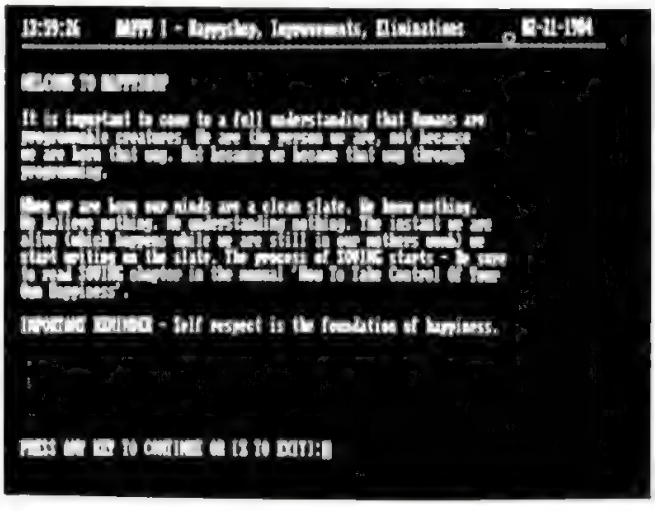
An introductory chapter presents the conceptual framework of Lonergan's method, which is rational, practical, and eclectic. Happiness, he explains, is a natural state of mind and should not be confused with possessions, actions, or experiences. Happiness can elude us for many reasons, but the most common is that we develop values and attitudes that make us unhappy. By learning to modify our values and attitudes (a process that Lonergan calls "soving"), we can control our sense of values and reorganize our lives in a way that allows us to be happy.

His language is that of suburban America: earnest, colloquial, businesslike, optimistic. He sounds like the next-door neighbor who has interrupted his gardening chores to offer good-natured advice on golf and the meaning of life. He even offers a disclaimer, like Dear Abby, urging readers with "serious emotional problems" to see a therapist. The documentation has a disarming, home-baked look that adds to the overall impression of sincerity.

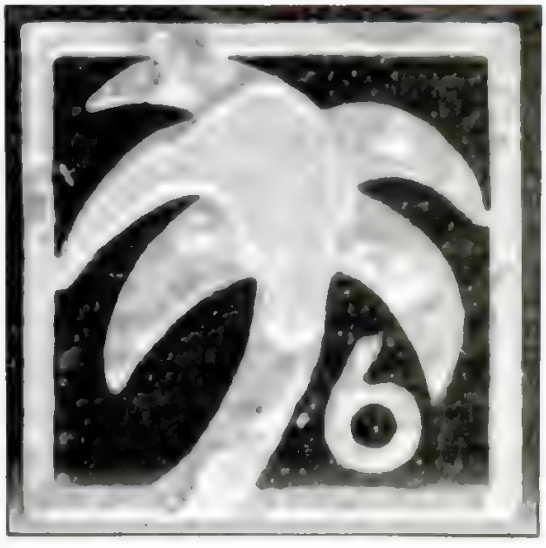
More Book Than Program

The traditional relationship between software and documentation is more or less reversed here: The manual does not mention the software until the last page, and the disk is largely a study guide on implementing the methods suggested in the book. In a menu-driven set of attitudinal exercises, the first routine lets you calculate a quantified "Happy Quotient." Other options provide lists of "happy" and "unhappy" characteristics and let the user create a password-protected "Happy Shop" file—a journal of efforts to improve self-esteem.

This package is not for everyone. But there are probably a lot of people for whom *Happy I* is appropriate technology for improving their feelings about themselves. Whether it can help you or not, it represents a determined effort to put the "personal" back into PCs. ■



The PC's Secret Tree



There's a tree in the IBM Personal Computer—and we don't mean the TREE command in PC-DOS 2.0. This palm tree is a little known part of the PC's system. If you are the first to tell us exactly where it can be found, we'll give you a piece of IBM software that's appropo to the solution. Send your answer to PC Tree Search, PC Magazine, One Park Avenue, New York, NY 10016. ■

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Level III—Federal Partnership/Corporate Package: for those who prepare Federal Partnership, Corporate, and Subchapter S returns.
Level IV—Overseas Tax Package: addresses the unique tax situations of United States Expatriates.

Levels II, III, and IV have a depreciation module and automatically compute underpayment penalties and minimum tax. In addition, Levels II and III automatically compute self-employment taxes, and Level II computes income averaging.

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People in the News: Hank Ketcham

The creator of Dennis The Menace is an enthusiastic user of Dr. Logo—and a helpful neighbor of Digital Research



BY JAMES LANGDELL

Would you trust Dennis The Menace with a computer? Digital Research did. The mischievous little boy, created by cartoonist Hank Ketcham, has starred in newspapers, comic books, and television for over 30 years. Now you can see Dennis using a PC in ads for *Dr. Logo*, Digital Research's version of Logo, a computer language that children can use. (*Dr. Logo* was reviewed in *PC*, Volume 3 Number 5, page 55.)

How did Dennis learn to program a computer? The answer will be revealed in Hank Ketcham's new book, *Dennis The Menace Meets Dr. Logo*, which Digital Research will publish this spring.

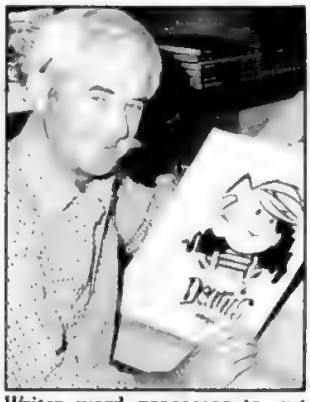
Why did a master cartoonist get so deeply engrossed in a software project? The secret is that Hank Ketcham's next-door neighbor isn't grouchy old Mr. Wilson—in real life he lives near Digital Research's headquarters in Pacific Grove, California.

***PC:** How did you get involved with personal computers?*

KETCHAM: I live in the shadow of Digital Research on the Monterey peninsula. I went to a seminar that Gary Kildall (the president of Digital Research) held last year for people in the neighborhood who were curious about what they were doing. It turned out that Gary and I went to the same school in Seattle at different times—we both had our start in the Great Northwest.

The more we talked, the more I got interested in the magic of the world of computers. A few weeks later, Gary wanted to know if I was interested in working closely with him in developing some educational material, mainly for the younger generation. I said I would, and it kind of got started that way.

I knew nothing about the technical side of it. I just sat down with a PC for the first time last April and learned the hard way. I started by using *Dr. Logo*. As Digital Research expanded the program's capabilities, I kind of grew with it and learned the various techniques. Later I used the *Super-*



Writer word processor to put down my thoughts. And, lo and behold, I got a book out of it: *Dennis The Menace Meets Dr. Logo*.

***PC:** The* Dr. Logo *manual included your drawings of a character named Dr. Logo.*

KETCHAM: Yes. That was his first blush. Any cartoon character goes through an evolution, and there've been a few changes in him. Basically, he's a learned little man who takes Dennis under his wing and teaches him the wonders of Logo.

***PC:** Is your book in comic book form?*

KETCHAM: No, not at all. Basically it's a narrative with appropriate illustrations on every page. The book is not aimed at the younger market. It's pretty much written for an adult audience. Hopefully the reader will be able to sit down with his grandchild or child and go through the same drills that Dennis and Dr. Logo have done. I use the characters as a catalyst to show how to do this.

The whole idea is to have the readers, children or adults, first get familiar with the keyboard and not be afraid. They can get the hang of it by doing something with the keyboard and seeing a reaction on the screen. Once the novelty of that has worn off, I explain the difference between software and hardware, then describe the disk and all of the equipment.

Then I talk about the artistic turtle in Logo that will do all kinds of things. I show some very simple graphics and talk about variables, recursions, how to repeat procedures, and how to save procedures. And then the readers do a little creative work on their own.

One of the nice things about Logo is the building-block concept. You can build a huge program by writing smaller programs and putting them together. And that's exciting. So is being able to save stuff. After you've sweated and groaned and moaned about getting it together, the next day you can recall it and there it is. Your great work is sitting there, ready for you to add what you're going to do today. It's richly rewarding when a kid can say, "Hey dad, come here. Let me show you what I did—just press my name."

***PC:** Have you made drawings with* Dr. Logo*?*

KETCHAM: Yes. As part of my own learning experience I've done graphics of Dennis and Dr. Logo, and drawn all kinds of different things. I found that all those curves are hard to come by when you're a new boy on the block.

***PC:** Will your book include any cartoons that you drew with* Dr. Logo*?*

KETCHAM: I don't think so. I find that books reproduce screens very badly. Maybe, if I do a second book, I'll put in a disk so readers can punch up the pictures themselves.

***PC:** In the daily comic strip, has Dennis The Menace encountered any computers yet?*

KETCHAM: Yes. I featured them a few months ago—his father brought one home. Since more and more families have computers in their homes, it will be something that can be used from time to time as a point of humor. It will become another prop, just like the stove or the TV set. It has great possibilities.

***PC:** I remember playing in the Dennis The Menace Park in Monterey when I was a child.*

KETCHAM: That was built in 1956, and it's still a very popular place.

***PC:** It was exciting, because the structures weren't like those in playgrounds anywhere else. When I climbed on them, I kept discovering different things I could do. One was like a cross between a sailing ship, a rocket, and a construction crane.*

KETCHAM: The whole idea was to stimulate children's imaginations. Don't tell them what they are playing on—let them imagine for themselves.

***PC:** Your playground was sort of a three-dimensional equivalent of Logo.*

KETCHAM: Well, almost. Each is an area where you have certain positive things, and you can go ahead and use them as you see fit, in your own way. Logo can be very stimulating, because you're armed with all these tools, and you can just flail away and let your imagination run wild.

I'm just a very enthusiastic keyboard puncher, and I play with *Dr. Logo* as often as I can. As a result, I've gotten well behind my deadlines on other things. That's tough, but well worth it. I look forward to continuing my association with *Dr. Logo*. ■

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complete cursor control: by character, word, line; page up and down instantly; go to top, bottom of document; auto scroll towards top or bottom
word wrap
margin justification, centering
adjustable margins, tabs, indents
reformat paragraphs
move, copy, delete, paste blocks
find with delete, insert, replace and wild card characters
keyboard remapping
multi-line headers, footers

Bonnie Blue can handle lines longer than the screen is wide, by horizontally scrolling the line. And, unlike some programs, Bonnie Blue lets you include any displayable character in your text, such as block graphics and foreign language characters.

Unique Features. With Bonnie Blue, you can "paint" display attributes onto your text, by the character, word, or line, or automatically as you enter text. With the monochrome adapter, you can paint any combination of underlined, bold, reverse video or blinking. With an 80 column monitor and the color/graphics adapter, this translates into a palette of 16 color combinations to choose from. And if your computer has both monitors, Bonnie Blue lets you use them both, shifting back and forth as you wish.

Powerful Printing Module. You can use these colors or display attributes to highlight text on the screen, and Bonnie Blue can remove them from a file when you want (all files created by Bonnie Blue are DOS standard). The Printing module understands these text attributes, and you can map them into any single printer function or combination.

For example, normally you would want underlined text to print underlined. But you can tell Bonnie Blue to print underlined characters as both underlined and bold. Bright text on the screen can mean double struck, or emphasized and in italics. You are at the controls.

The first Print formatting module supports all the text capabilities of the Epson MX series with Graftrax Plus. By the time this ad appears, we will be supporting other popular dot-matrix and letter quality printers.

More than thirty "dot" commands give you added control of the format of your finished document. You can send it to a disk file instead of the printer, or preview the final page formatting on the screen.

Toolbox. The Toolbox is a set of useful functions, called "filters" that allow you to extract information from your files and transform their content. With these tools, you can join files together, sort lines of text, count words, find and substitute patterns, etc. Writers and programmers find this a useful collection of productivity enhancers.

Bonnie Blue is also great for a hard disk system. A thorough User's Guide, complemented by help screens and roadmaps, make the Bonnie Blue an exceptionally easy-to-learn and easy-to-use system.

Order yours today, or send for our free brochure. Bonnie Blue is available exclusively from **Bonnie Blue Software,** P.O. Box 536, Liverpool, NY 13088.

Bonnie Blue runs on IBM Compatibles such as Compaq, Columbia, etc. Printers supported include Epson RX, FX Series, Qume, Okidata and more.

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City_____ State_____ Zip_____

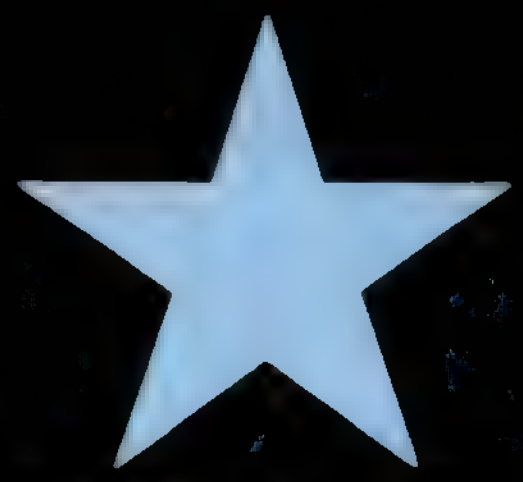
Company_____

Minimum recommended system:
IBM PC, 128K, 2 disk drives, PC-DOS 1.1 or 2.0, 80-column monitor or monochrome adapter, or both, Epson MX-80 or MX-100 with Graftrax Plus.

Versions available soon for PCjr. Write for details.

PC 4/17/84

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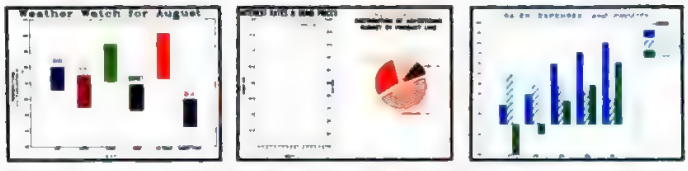
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Chart-Master presents a *clear picture* of the "bottom line," which conveyors of information understand and decision makers appreciate. That's why major corporations like GE, Eastman Kodak, Exxon, Union Carbide, GM, AT&T, DuPont, 3M, Citibank, Motorola, Procter & Gamble, and GTE rely on Chart-Master to translate "volumes of complex data into meaningful information."

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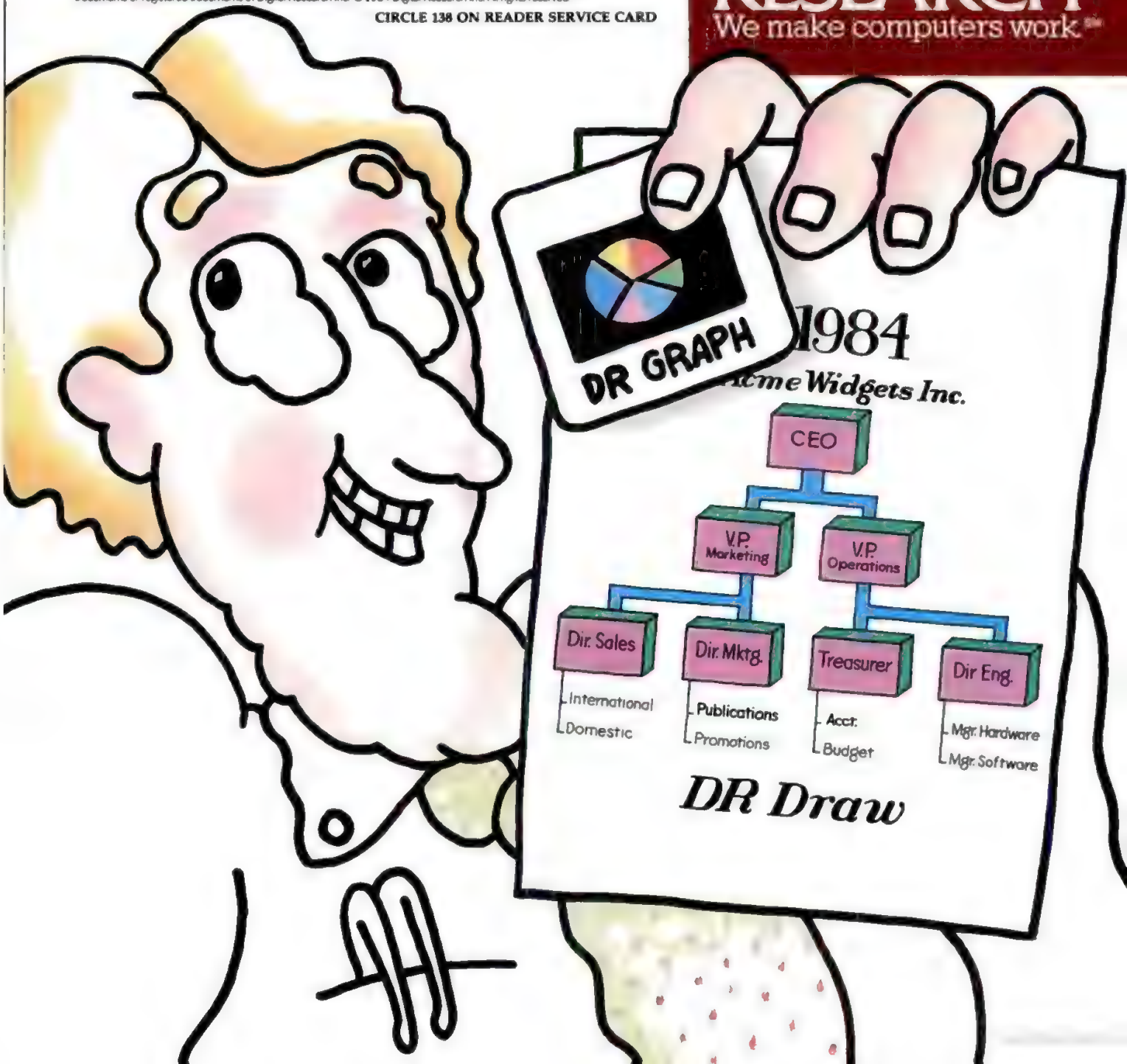
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Amdek . your guide to innovative computing!



Synthesis, Anyone?

The Apple Macintosh has arrived, and it brings with it some searching questions—as well as a welcome end to that curious facial expression we've come to call the "Mac Look."

Now it's really hit the fan. Apple has released the Macintosh, and it's difficult to imagine a microcomputer less like a PC.

So what, you say.

What we have here is a failure to communicate, folks. The battle lines are being drawn. Forget Blue versus Gray; that was just an economic issue. Ford versus Chevy? You're getting warmer. There are Chevy families and there are Ford families, and if Pop drives an Impala, there's no way daughter will ever own a Mustang. Disinheritance takes on a whole new meaning when you deal with emotionally charged issues like this. Sure, there are some aberrant Dodge owners out there, but people like that are so devoid of cultural heritage and respect for tradition that they would probably think nothing of buying a DEC Rainbow.

The looming face-off between IBM and Apple is nothing less than a battle for the hearts and minds of men. Historians will record the ensuing conflict as the turning point in human-machine relations. We're not talking mouse versus cursor keypad here, although that issue is certainly part of it. It's more than high-resolution black-and-white versus color graphics. It's much too emotional an issue to be clouded by mere features or physical specifications.



Bill Machrone

Apple's much-ballyhooed Macintosh ad, first screened during the Superbowl, is more to the point. First of all, it's not about Macintosh; it's about a way of life. It would have you believe that anyone not using an Apple is a gray conformist with a stunted brain. That's okay; that's the purpose of advertising. More important is what the ad implies about the importance of using an Apple. "Live free or die," says the ad, like the license plates of New Hampshire residents.

Why would Apple spend millions to thumb its nose at IBM? You might think it's like climbing up a stepladder to punch a giant in the kneecap. Not so. IBM has to take notice of Apple because it is competing in a market that Apple invented. Apple has very nearly lost it, but as Yogi Berra used to say, "The game ain't over until it's over."

Like the Apple II, Macintosh (even the spelling is unconventional) dares to be different. Apple II fomented a standard in a chaotic sea of early micros. Once the market had settled into two camps, Apple and CP/M, IBM combined a 16-bit processor with a CP/M-like operating system and Apple-like expandability. The resulting PC is a runaway best-seller, but it has caused the industry to make a major digression. Progress slows while everyone tries to be PC compatible.

Macintosh could be compared to the first Justin Morgan in a field of dray horses. It may not be the last word in strength. It may not be the fastest. But you can't beat it for sheer pluck, determination, and courage.

Mac Fever

When the PC was introduced it had many detractors, especially those critical of its unoriginal technology and conservative design. While, admittedly, there was much speculation about the nature of the machine prior to its release, it pales before the second-guessing that surrounded the Macintosh.

Editorial director Jon Lazarus and I paid a call last fall on Marty Alpert, founder and head of Tecmar. We'd heard rumors that Tecmar was going to be doing

NOW AVAILABLE

Writing and Organizing Business and Personal Letters Has Never Been So Easy.

A Powerful and Flexible Total Correspondence Package

LAYOUTS:

- User-defined letter format.
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- Supports 5"x7", 8½"x11", and 8½"x14" paper size.

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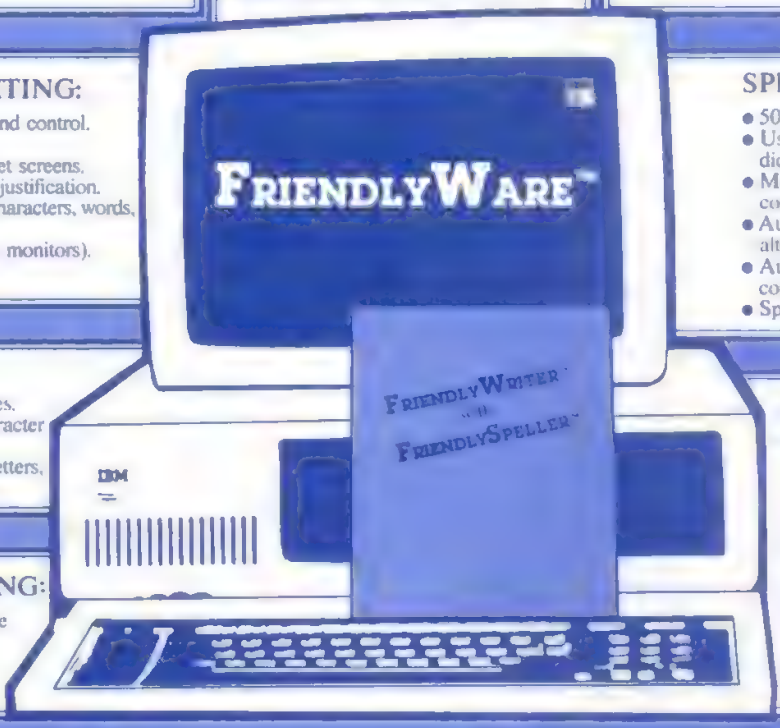
- Supports over 35 popular printers.
- Automatically initializes most parallel printers.
- Accommodates special printer functions.
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- Global Search of Letter Files.
- Copy one letter, all letters, or a group of letters to a new location.
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- Single keystroke operation and control.
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- 50,000 word Master dictionary.
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- Misspelled words displayed in context.
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IN GENERAL:

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TWO DISKETTE PACKAGE, REQUIRES PC-DOS (1.0, 1.1, 2.0), 64K MEMORY with DOS 1.0 and 1.1, OR 96K MEMORY with DOS 2.0, ONE DISK DRIVE, ANY 80 WIDE MONITOR, ANY IBM-COMPATIBLE PRINTER

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CIRCLE 268 ON READER SERVICE CARD

some add-on products for Mac and we naturally asked about them. An expression we came to term the "Mac Look" spread across Marty's face: a gleam in the eye, a smile that kept slipping into silly grin, and lines of tension from the conflict of wanting to say more but knowing he couldn't.

Other Mac Lookers included contributing editor Robin Webster and Maggie Canon, editor of *A+*, Ziff-Davis' Apple magazine. There were more, to be sure, and they all reacted in exactly the same way. In response to my questions, one would comment, "It's *very* small." Another would ask, "Have *you* seen it?" Then they would clam up. After a while I began to feel like one of the 12 or so people in the world who hadn't seen Mac.

I never saw the nondisclosure agreement that Apple made these people sign, but it must have been a doozy. In blood, firstborn child, the works. One of the more persistent rumors was that there would be an MS-DOS–compatible add-on, so we plied knowledgeable individuals and potential informants with liquor and chocolates. We got nothing. Just the Mac Look. Marty and the others saw something in Mac, something like Justin Morgan, that compelled them to want to make a commitment to it, to nurture and improve the breed.

Around the same time, we also encountered a number of people who had seen the PC*jr* in several preproduction versions. There was no corresponding Junior Look.

And therein lies the difference. The Mac is a conscious effort to improve the breed, to make the lot of computer users better. Some may question the results, but the sincerity of the Macintosh's design is indisputable.

Junior Frolics

The PC*jr*, by contrast, is a clever, almost cynical, rehash of the PC—not that it was intended to compete with Mac. Indeed, the PC*jr* was designed to have essentially no competition, not even the PC. Also, the two machines have entirely different starting points: Apple has decided on innovation at all costs and has therefore come up with a machine that is somewhat Lisa-like but incompatible with everything else.

On the other hand, that the PC*jr* would be compatible with the PC was a given.

One of the rumors was that there would be an MS-DOS–compatible add-on, so we plied knowledgeable individuals and potential informants with liquor and chocolates.

With the large, presold audience of PC users, there could be no alternative marketing strategy for IBM. Although a fair amount of software was created specifically for younger siblings, most of it evolved from existing PC products. The PC*jr*'s user interface, like the PC's, was a minor consideration. On the Macintosh, it is everything.

The PC's operating system is a ubiquitous presence, intruding upon your consciousness. MS-DOS is a frank imitation (with enhancements) of CP/M, which is a frank imitation of several DEC operating systems. I needn't belabor the shortcomings of MS-DOS, but any operating system that has as its primary focus the logged disk drive is more concerned about the machine than the user. Technology has allowed us to move past this point. We shouldn't have to put up with operating system concepts that are nearly 20 years old unless there is nothing better. The original stuff has been warmed over and infused with Unix and with some English-like commands, but it's still the same old story.

Human Factors

Meanwhile, Apple has gotten behind all the work done at Xerox's PARC (Palo Alto Research Center) on human factors in system design. Now some of its findings are approaching the age of majority and they are inherently more valid simply because somebody took the time to ask humans for their preferences instead of stressing the convenience of the programmer or system designer. It's taken Apple 3 years to integrate the hardware and software functions, and the results speak for themselves. I won't turn this column into a Mac review—there are plenty of those already—but there's no doubt that it's an easy machine for beginners and intermediate users.

Can you put a Mac-like or Lisa-like user interface on a PC? Sure. It's called *Visi On*. Will it perform as well as the Mac? No way. The hardware was never designed to handle it. Oh, you'll see some integrated packages that provide many of the same features, but they're just adding another layer to insulate you from the unfriendliness of the operating system. The real point is that some users now have an alternative to the PC. The degree to which they express a preference for something else will determine the degree to which IBM will react.

So we're looking for a new synthesis from Big Blue, one that will capitalize on the PC's success and take the user into account. Unix's availability on the PC is encouraging, as many manufacturers have proven that the graphics workstation orientation of machines such as the Mac integrates beautifully into the Unix way of doing things. In the meantime, the armies are on the march in the marketplace. We look to Apple not only to survive, but to continue to take a leadership role in innovative system design.

When the smoke clears, the computer user's world will doubtless be a better place. ■

Practical Printers at Prudent Prices

Dot Matrix

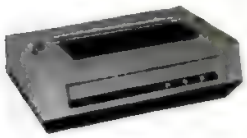
Printer compatibility with the IBM-PC marches on: in addition to the Okidata Microline Series with Plug-N-Play, the C. Itoh Prowriter now comes in a new version (the BPI) that's compatible with the IBM-PC (see below). So what's keeping the rest of the manufacturers?

ANADEX

9500B	$1119.88
9501B	$1119.88
9620B	$1209.88
9625B	$1309.88
WP-6000	$2359.88
WP-6500	$2599.88
WP-6000/6500 Tractor	$139.88

C. ITOH

Prowriter 1 & 2
Prowriter BPI
Prowriter SP



C. Itoh's **Prowriter** (120 cps) features 10, 12, & 16 cpi, a proportional/correspondence quality font, double strike, double-width, sub/super scripts, dot graphics (160 x 144 dpi) & friction/tractor feed.

The **Prowriter BPI** offers code-compatibility with IBM-PC block/dot graphics codes & it has all the features of the Prowriter. A nice move.

The **Prowriter SP** has faster print speed (180 cps), true sub/superscripts and italics. A new printer with nice features.

Prowriter	$379.88
Prowriter 2	$609.88
Prowriter BPI	$479.88
Prowriter SP	$519.88

EPSON

RX/FX Series	$CALL

IDS/DATAPRODUCTS

P-480	$439.88
Prism 132	$1489.88
w/4-color	$1699.88

INFORUNNER

Riteman	$339.88

MEMOTECH

DMX-80

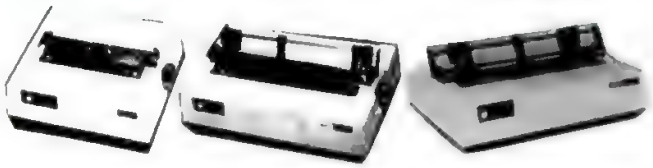


A dramatic black printer! The **DMX-80** (80 cps) features 10, 12 & 16 cpi, italics, double-width, half-width, enhanced/bold print, dot graphics (120 x 144 dpi), friction/tractor feed. Comes with a 4,000,000 character ribbon. Epson code compatible in text mode (questionable in graphics). Quiet printing & a sharp design make it ideal for home or office. The **DMX-80** is serviced by Panasonic.

DMX-80 $339.88

OKIDATA

Microline Family



The Okidata ***Microline*** family offers IBM-PC users a wide range of features for almost any application. All ***Microline*** printers are made with the same rugged materials and care. No matter which printer you select, you've chosen one of the best printers made.

The **Microline 92** (160 cps) is ideal for word processing. It features 10, 12 & 17 cpi, a correspondence font, double-width, emphasis/boldface, sub/super scripts, underlining, pin/friction feed (tractor is optional on the **92**) & dot-addressable graphics (120 x 144 dpi). The **93** is the 136 column version. Parallel interfaces are standard, the RS-232C interface is optional.

The **Microline 84** (132 col) is the Step 2 version, featuring 200 cps at 10, 12, & 17 cpi (w/double-width), all with a correspondence mode & dot addressable graphics. Parallel or RS-232C interfaces available.

A new PROM called **PC Plug-n-Play** turns a **92**, **93** or an **84** into an IBM-PC compatible printer, with full capabilities. You will sacrafice a few features (like 12 cpi) but the PROMs are worth it if total compatibility is your goal.

The **Microline 82A** (120 cps) is a data cruncher. Features 10 & 16 cpi (5/8 double-width). Dot-addressable graphics are optional. The **83A** is the 136 column version.

Microline Series $CALL

MANNESMANN TALLY

MT-160 L	$629.88
MT-180 L	$879.88
MT-Spirit	$329.88

QUADRAM

QuadJet	$CALL

STAR MICRONICS

Gemini 10X	$299.88
Gemini 15X	$429.88
Delta 10	$499.88
Delta 15	$589.88
Radix 10	$629.88
Radix 15	$739.88

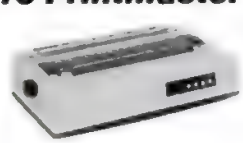
TOSHIBA

P-1350	$1799.88

Letter Quality

C. ITOH

A10 Starwriter
F10 Starwriter
F10 Printmaster



The C. Itoh **Starwriter** (40 cps) features 10 & 12 cpi, sub/super scripts, underlining, 6 & 8 lpi, Qume code & Diablo supplies. The **A-10 Starwriter** has the same specs, but it's slower (20 cps). The **Printmaster** has the same specs, but it prints faster (55 cps).

Both the **Tractor Feed** & the **Sheet Feeder** fit all three models.

A-10 Starwriter	$599.88
F-10 Starwriter	$1119.88
F-10 Printmaster	$1469.88
Tractor Feed	$219.88
Single Bin Sheet Feeder (A10/F10)	$619.88

COMREX

CR-2	$509.88
CR-2 Tractor	$89.88
CR-2 Sheet Feed	$189.88

DIABLO

620 (RS-232C)	$939.88
630 (PC)	$1999.88

DTC

DTC 380Z	$1199.88
Tractor Feed	$149.88
Sheet Feed	$619.88
StyleWriter	$759.88
Tractor Feed	$129.88
Sheet Feed	$279.88

NEC

2010/2030	$899.88
2050	$1039.88
3530	$1699.88
3550	$1859.88
2000/3500 Tractor	$239.88
2000/3500 Sheet Feed	$479.88
7710/7730	$2199.88
7700 Tractor	$379.88
7700 Sheet Feed	$619.88

QUME

Sprint 11/40	$1559.88
Sprint 11/55	$1769.88
Tractor Feed	$219.88
Sheet Feed	$619.88
LetterPro (20cps)	$CALL

SILVER REED

EXP-550/500



The Silver Reed **EXP-550** (17 cps) is a 132 column letter-quality printer with 10, 12 or 15 pitch, sub/superscript, underlining & ***true*** Diablo 1610 emulation, making it compatible with most word processing software. It's friction fed, & it features a page injector, an optional tractor is also available.

The **EXP-500** (12 cps) is a 100 column letter-quality printer with the same specs as the **EXP-550**, but slower & without page inject or proportional spacing.

EXP-550 (Parallel)	$609.88
EXP-550 Tractor	$129.88
EXP-500 (Parallel)	$449.88
EXP-500 Tractor	$119.88

SMITH-CORONA

Messenger

The **Memory Correct III Messenger** combines an electric typewriter ***and*** a letter-quality printer. It features 12 cps, 3 pitches (10, 12 & 15), variable line spacing, 10.5" writing line, backspacing & auto-correction. It comes complete with parallel/serial interface.

Messenger $589.88

STAR MICRONICS

PowerType

The **PowerType** (17 cps) has 110 columns (11" print line), 10, 12 & 15 cpi, proportional type, sub/superscripting, backspace/underlining & Diablo 620/630 code compatibility. A nice printer for the price.

PowerType $359.88

Accessories

Printer Stands

Heavy-guage steel with a baked enamel finish (beige), with a paper slot in the center for bottom feeding. Fits 40 or 132 column printers (specify).

80 Column Stand	$39.88
132 Column Stand	$49.88

Microfazer

Printer buffers from 8K to 512K, in parallel in/parallel out configurations. These are stand-alone units with a pause feature and copy/clear buttons. User expanable. Power supply included, but the cables are optional.

8K P/P	$129.88
64K P/P	$169.88
128K P/P	$239.88
256K P/P	$549.88
512K P/P	$769.88
Male-male cable	$29.88

Cables

Printer cables for the IBM-PC, IBM-PC/IDS, Compaq, Columbia MPC & VP, Eagle-PC/Spirit and many others, as well as 9-wire modem cables. All cables $29.88

Printer Switches

2-way & 4-way switches for 36-pin Centronics or 25-pin RS-232C. All connectors are female, & cables are extra.

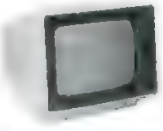
2-Way Switch Box	$109.88
4-Way Switch Box	$CALL

Monitors

AMDEK

300G (12" green)	$149.88
300A (12" amber)	$159.88
310A (12" amber)	$199.88

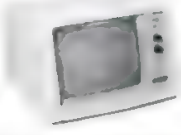
NEC



JB-1205M (12" amber)	$169.88
JB-1201M (12" green)	$169.88

PRINCETON GRAPHICS

HX-12



The **HX-12** is one of the finest RGBs available for the IBM PC. Features 16 colors, .31mm dot pitch (NEC's tube), 690 dots by 240 lines interlaced & 15MHz bandwidth. Comes with its own cable

PGS also has the **Max-12**, an amber monitor with TTL input (IBM monochrome adapter input), 18MHz bandwidth & 720 x 350 lines.

PGS HX-12	$509.88
PGS Max-12	$199.88

QUADRAM

QuadChrome	$519.88

Modems

HAYES

Smartmodems

300 baud	$229.88
300/1200 baud	$539.88
1200B w/SmartCom II	$459.88

NOVATION

Smartcat Modems

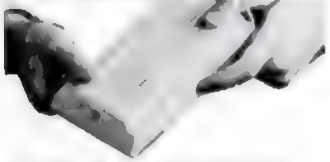
300 baud	$189.88
1200 baud	$439.88

Access 1-2-3

IBM-PC internal board modem w/Crosstalk $449.88

US ROBOTICS

Password
PC Modem
PC Modem 256



All modems have LSI-design, 300/1200 baud. Direct connect, originate/answer, auto dial/answer, auto mode/speed select, full/half duplex (local echo) & audio phone line monitor.

ROLAND DG

MB-121
MB-122



An exceptional monitor series that offers either an NTSC composite or TTL-type video output (compatible with the IBM PC monochrome adapter). The **MB-120**'s feature 12" diagonal screen with a 90 degree angle & non-glare surface, 80 col x 25 line display, an 18MHz bandwidth, 640 dots horizontal by 200 lines vertical resolution and composite video (MB-121, RCA phono cable included) or TTL (**MB-122, w/TTL-type DB-9 male cable). They come green (G) or amber (A)**

Roland DG MB-121 (Green or Amber)	$159.88
Roland DG MB-122 (Green or Amber)	$179.88

The **Password**, an external device, comes with an RS-232C cable (specify male or female DB-25), power supply & modular telephone cable.

The **PC Modems** are plug-in modem boards that have all the features of the Password. The **PC Modem 256** are also modem boards that come with 64 or 256K RAM, a parallel port & real-time clock with a battery back-up.

Password	
1200 baud	$379.88
300 baud	$159.88
PC Modem	$CALL
PC Modem 64K	$579.88
PC Modem 256K	$779.88
Telpac	$69.88

Peripherals

ALLOY

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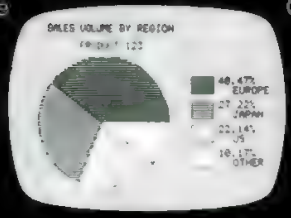
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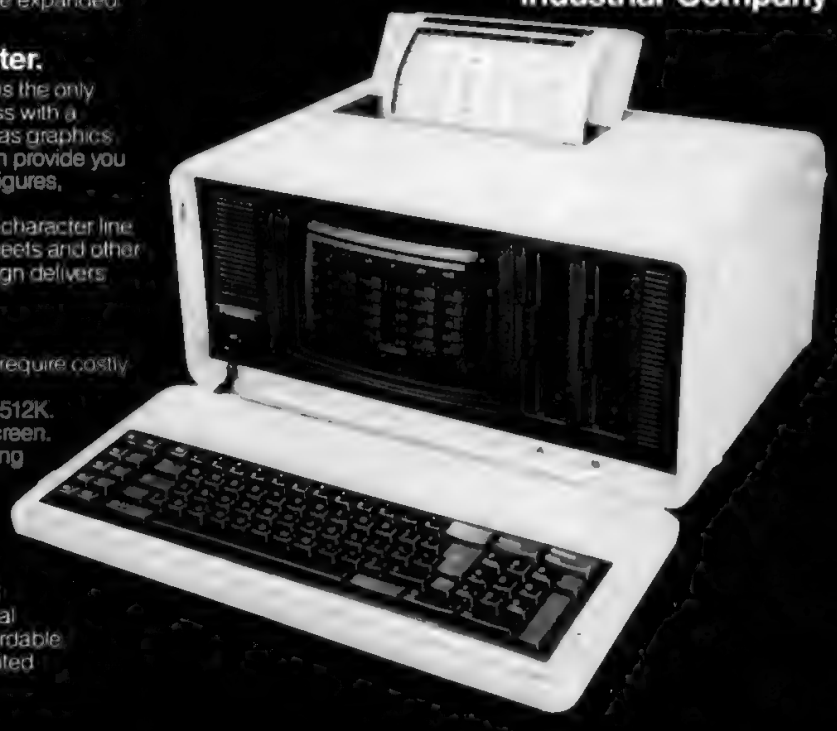
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CIRCLE 173 ON READER SERVICE CARD

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Letters To PC

WordStar's String Collection

In Joel Pitt's review of *PC-Write* ("Word Processing On The Honor System," *PC*, Volume 3 Number 3), he lauds the program for maintaining a current search string. He claims *WordStar* does not. In fact, *WordStar* does remember the last string. Simply press Ctrl-L to access it.

Jesse Berst
Redondo Beach, California

A Gleeful Dealer

I have a confession to make. I read Professor Clark's guest editorial, "A View From The Ivory Tower" (*PC*, Volume 3 Number 3), with unabashed glee. He didn't buy from a local dealer and got his just desserts—17 days of frustration, misinformation, runarounds, confusion, and total lack of support. It does a local dealer's heart good!

For the last 2 years, large computer companies, especially IBM and Digital, have been short-circuiting their local dealers and offering their products at unfair discounts that dealers can't afford to meet. These same discounts give their products an unfair competitive advantage over competing brands sold through local dealers, whose suppliers do the honorable thing and decline to sell directly to universities, corporations, and other large accounts.

Purchasing his computer directly from IBM was Clark's first sin. He compounded it twice. First, he purchased a printer and software from mail-order houses. Second, he visited a number of local dealers, gaining a free education in computers when he evidently had no intention of purchasing locally. To my way of thinking, this was his greatest transgression.

I don't object to losing a sale to a local competitor, but I do resent being pumped for information by a noncustomer who plans to purchase his system directly from a manufacturer or through a mail-order house.

Let me present a different scenario for



Clark's indoctrination into personal computing, one that would have happened had he purchased his system through a local dealer. Prior to the delivery of his system, Clark would have spent an hour or so learning his computer's operating system and assembly and how to get started with the tutorial or learning disk that accompanied his software.

Prior to its delivery, both his printer and software would have been installed for his system. All elements of his system would have been tested for a day or so to insure that they were "burned in." He then would have been encouraged to phone or stop by the shop with any questions or problems he was encountering. He would have received prompt, willing, and experienced help.

In the last 2 years, we've sold well over 300 personal computers to local university faculty, staff, and students. A good number of our sales have been by referrals. I'll bet that most of our users will agree that the service, knowledge, and support that they received were well worth any additional price they might have paid when they purchased their system.

I ask Clark what value he places on his time and his emotional well-being? How much money did he really save by purchasing his computer directly from IBM and the remainder of his system through mail-order houses? And, Clark, if you're still having problems understanding your system, give us a call. Our fee for noncustomer training is $75 an hour—and we're worth it.

Hollister Moore
Philadelphia, Pennsylvania

NEC Fan

This letter is in response to Michael Clark's guest editorial, "A View From The Ivory Tower" (*PC*, Volume 3 Number 3), wherein he described the problems encountered installing *WordStar* with a NEC 3550 printer. Having had the same problems, I could appreciate the frustration Clark must have felt. I also had to install the printer as an IBM Parallel Printer, but could not access some of NEC's features, such as super and subscripts and pitch changes. It took 5 nerve-racking

months of dealing with both MicroPro and NEC to find the solution as follows: Start with all switches off, then on switch 1, turn on toggles 3 and 5; on switch 2, turn on toggles 4 and 5; on switch 3, turn on toggle 6. With these settings, and the printer installed as an NEC 3550, everything works beautifully. Evidently, this information has not yet been passed on to retailers or consumers. I must add that in spite of the difficulties I have had in dealing with the two companies, the *WordStar*/NEC combination works well and I've become a real fan.

S. Mara Ambrose
Frederick, Maryland

Cheers for dBASE II

We were extremely pleased with the coverage of our training program for *dBASE II, Cdex Training for the dBASE II Program* ("Judging The Guides: Here Come dBASics," *PC*, Volume 3 Number 2).

Just a brief note: The article states that the package contains four single-sided diskettes. This is not true; the package has three diskettes. Also, we have plans to convert all of our PC products to double-sided diskettes in the near future.

John Noon
Marketing Manager
Cdex Corporation
Los Altos, California

I enjoyed reading about *dBASE II* in your February 7 issue (*PC*, Volume 3 Number 2). As a manager, I like the idea of having a topic discussed at length and from many different viewpoints in a single issue. This enables me to make intelligent decisions about software purchases.

Keep up the good work. I look forward to reading future theme issues.

Ernst Bak
Fairfield, California

Window Software

Are your IBM watchers paying any more attention to their task than your proofreaders? Possibly the rush to get out an issue every 2 weeks is getting to you. I noticed two significant omissions.

The commentary in "PC News" was close in its implication that windowing programs are more promise than reality ("Who'll Clean Up With PC Window Software?" *PC*, Volume 3 Number 2). James Langdell owes himself a treat. He should go see IBM's 3270 Personal Computer, which is being demonstrated in most IBM sales offices. It has been quietly shipped to early users since shortly after its announcement last October. The Control Program provides seven user-session windows, an operator information area, and two help screens in splendid resolution of brilliant color. Of course it does require attachment to an IBM control unit and support of an IBM mainframe, but it certainly sets the state of the art.

Also, "Computer-Assisted Instruction: Flying High With Pilot" included a summary of available products, missing two offered by IBM. You could be forgiven for skipping the *Personal Computer Interactive Instructional System*, which is the same as *Trainer 3000* but bearing the IBM logo. But how could you have missed *Private Tutor*, the best-priced performer of them all? At an unbelievably low $50 it provides authoring, presentation, and administration of scores, has an editor that produces bug-free codes, and includes worksheets for preparing lessons.

In spite of such shortcomings, I enjoy the every-other-week surfeit of *PC*.

John Butler
Potomac, Maryland

James Langdell's article focused on window software for the IBM PC and XT. The author would love to be treated to a 3270-PC. Give him one and he'll buy you a drink.—Ed.

Chip Error Correction

There are two factual errors in Sol Libes' guest editorial, "Coming Of Age Together" (*PC*, Volume 3 Number 2). His statement that the earliest version of the IBM PC used 4K-bit RAMs is incorrect. Being the owner of a 2-year-old PC, I can attest to the fact that it contains 16K dynamic RAMs. A perusal of the first edition of the *IBM Technical Reference Manual* verifies that 4K chips were never used.

Also, Libes implies that the IBM PC cannot run at full speed when using a 5Mhz 8087. Since the PC uses a 4.77Mhz clock frequency, it does not need to slow down to accommodate a 5Mhz 8087. Full speed in this case, however, is much slower than for several PC compatibles that use a faster clock rate.

Finally, let me give my vote of appreciation for a smaller *PC Magazine* every 2 weeks rather than a really fat one once a month. So far, the post office has been able to deliver the thinner magazine without the mutilation that I had come to expect.

Robert Pirko
New York, New York

Sol Libes replies:
Robert Pirko is correct in criticizing my guest editorial. What I meant to say was that the earliest versions of integrated personal computers used 4K-bit RAM chips.

Also, in referring to the 8087 math coprocessor, I was discussing it in terms of the newer generation of 8086-type machines that typically have clock speeds significantly faster than the IBM PC. With these machines, measures must be taken to slow down the main processor chip when accessing the 8087. I am sorry if I implied otherwise.

I trust that Pirko found the rest of the information in the article worthwhile.

Great Games for PCjr?

What does Phil Wiswell mean in his article "Coming Soon: Games For The PCjr" (*PC*, Volume 3 Number 1)? He writes, "What is certain . . . is that the PC*jr* . . . might be the best game machine." I realize that it may be possible to misconstrue something from this sentence. Lawyers do it all the time. Anyway, I suspect that he meant it to be a compliment. If so, then it

LETTERS TO PC

is certainly a left-handed, not to mention sinister and gauche, compliment. On the other hand, since any computer might be the best game machine, maybe he was trying to hide his lack of enthusiasm.

Gordon H. Fairbanks
Honolulu, Hawaii

Phil Wiswell replies:

Your suspicion was correct. My closing comments about the usefulness of the PCjr were indeed meant to be complimentary, and were meant to be delivered in a left-handed and, yes, even sinister manner. But gauche? I don't think so. Not considering the connotations the word has now taken on.

Gauche was IBM's expectation that the $700 PCjr model was worth debuting with only four pieces of software, all of which were cartridge-based action games, and none of which was original or outstanding. But one look at the technical specifications and one can read the potential for graphics, speed, and more.

So I ask: Without a disk drive, who will buy the lower model PCjr, and what will they use it for? Word processing? Not on a chiclet keyboard. Data processing? Not without a disk drive. Games? Yes. 64K is plenty of RAM for cartridge-based computer games, which have not yet exceeded 16K ROMs. And the presence of not one but two ROM ports that can "read" each other could also be put to good use in designing state-of-the-art computer games.

Therefore, in my opinion, it is certain that the PCjr has the potential to be the best game machine ever designed. But the best game machine ever designed cannot be recognized as such without running the best games ever designed. And let's face it, if Crossfire, Mouser, Mine Shaft, *and* Creepy Corridors *are indicative of the types of games the IBM Product Center will market for the PCjr, game players will feel disappointed. I know I do.*

I was not trying to hide my lack of enthusiasm so much as trying to hide my inability to understand the motives of IBM. Say what you will about computer

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LETTERS TO PC

gamers, they aren't stupid enough to spend $700 for a machine that plays games designed for machines of lesser quality and importance.

Tying Up Loose Ends

Dorothy Samuel's article "Computer Scan: No Place To Hide" (*PC*, Volume 3 Number 1) was quite timely. Before conformity becomes second nature, what can be done to stop the abuse and misuse of the computer? I don't care if a file says that I have been fired from every job I have ever had or that I failed sixth grade seven times, but what I do care about is who has access to this information. What can be done to limit this access?

Going back a step, who decides what information should be retained about an individual? In my view, it should be the individual, not an authority above him.

It seems that there are a lot of loose ends to be tied before we become a fully integrated society.

Bindu Ahuja
Scarboro, Ontario

How Long Must I Search?

I enjoyed reading about *Notebook* in Bryan Pfaffenberger's article "The Researcher's Assistant" (*PC*, Volume 3 Number 1). He mentioned that searching is slow without the aid of a hard disk. I wonder if you can give me some quantitative data on how long it takes to search for a particular average number of characters and a particular number of characters in a search phrase. I have an IBM PC with dual floppy disks.

Stanley Seltzer
Upton, New York

Bryan Pfaffenberger replies:

In my article, I referred to the slowness of Notebook*'s scrolling function, which permits you to move from record to record through the database. Each record has to be paged from disk to memory and back again, making for slow going. Since I wrote the review, however, Pro/Tem has issued a new version (1.3) that enables*

you to locate a data record very rapidly.

The program's search function, the one that causes the computer to find records meeting a set of search criteria, won't set any speed records among microcomputer database programs, but it's not annoyingly slow. Using floppy drives, you could take a 1-minute break while the program searched 100 bibliography data records (including annotations) for all records containing a 20-character search string.

Keyboard Gripe

It was with some amusement that I read the article on the Dvorak keyboard in your January issue ("Bye-Bye Qwerty," *PC*, Volume 3 Number 1). This interest in Dvorak seems to crop up quite regularly, although studies show that the gains are really not as great as Dvorak and his advocates have claimed. Moreover, there are apparently even better ways to improve the keyboard than by moving the keys around. Since it seems that change is hard to come by, the effort might as well be put into getting a keyboard that will make a significant difference—such as having single keys for frequently typed combinations such as *the*.

You could do a service by writing an article on some of the real alternatives to the Dvorak keyboard.

Norman D. Kurland
Albany, New York

X-ray Damage

I am currently part of a team working on a large application project to run on the PC. We travel frequently with the airlines, and as a consequence, I believe our disks are being "zapped" by the airport X-ray equipment.

Based on my memory of high-school physics, I do not believe that X-rays themselves are damaging the disks.

I think that the magnetic fields of the X-ray equipment are the culprits. Although we remove the disks from our hand luggage prior to entering the X-ray machines, we still sustain occasional damage. I believe that this happens at the entry

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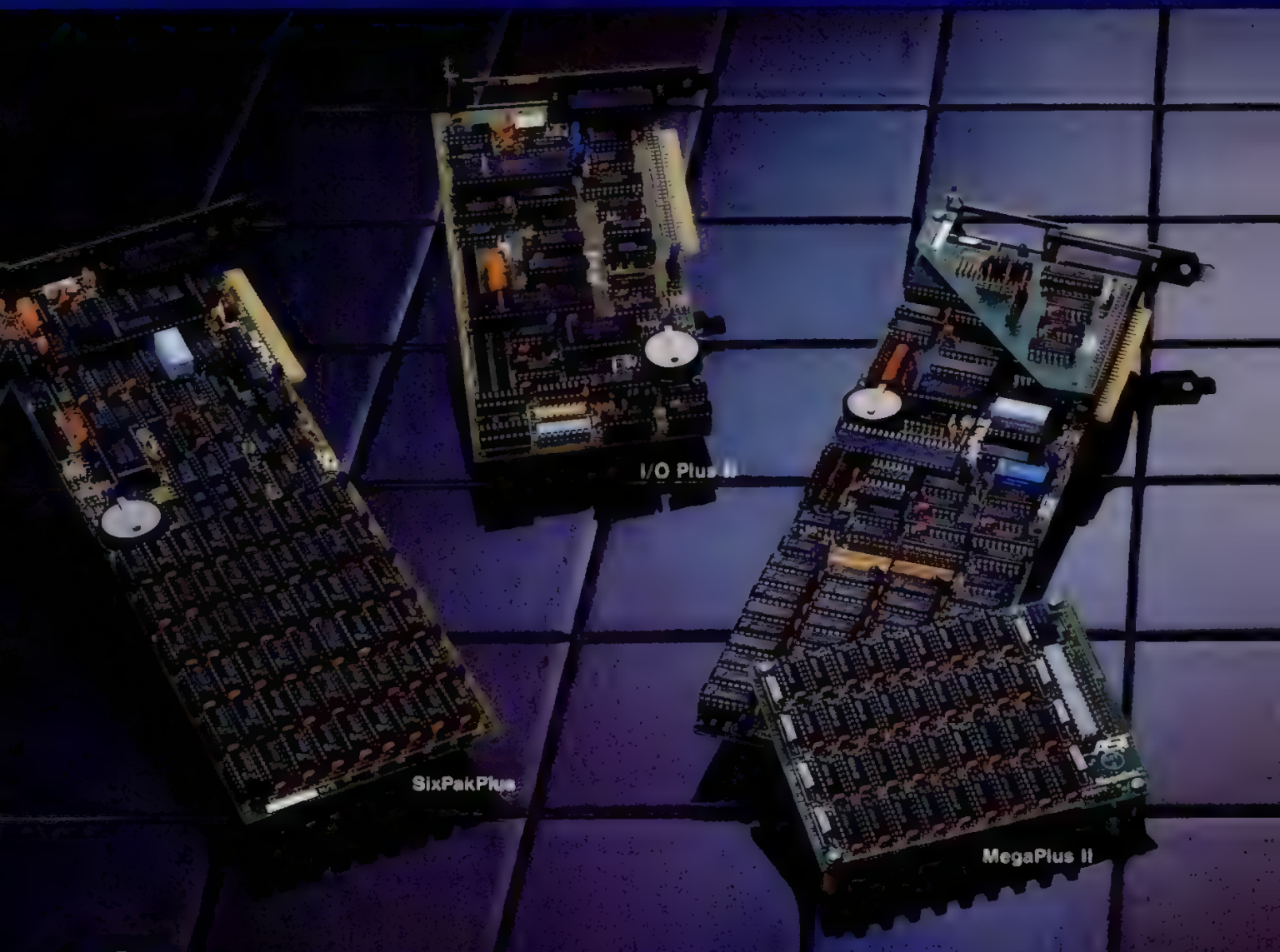
CIRCLE 307 ON READER SERVICE CARD

With an AST Research Multifunction Board, you can realize the full potential of your IBM PC or PC-XT without wasting valuable slot space. By combining your memory and input/output requirements on a single card, you can take advantage of more of the capabilities IBM designed into the PC, while leaving space for future enhancements as they are introduced.

AST Research Multifunction Boards can add the following features to your PC:

- **User Memory from 64K to 512K** — When added to your existing system memory, brings your PC up to its maximum of 640K. This enables you to run larger spreadsheets, create larger in-memory databases, or you can use the additional memory along with the supplied AST SuperPak™ software for print spooling or for simulating floppy drives to increase your PC's throughput.

- **Serial Ports** — By connecting a modem to a serial (async) port, your PC can communicate with other computers over telephone lines. By connecting a serial printer, you can obtain high quality print output. Other serial devices such as a plotter or mouse may also be connected to a serial port. The PC allows for the installation of up to two serial ports.



Number One Add-On Products for IBM PC

Number One Add-On Products for IBM PC



Optional features may be added by the user at any time by installing an AST Research Upgrade Package.

All products come with extensive documentation as well as all necessary adapter cables.

	MEMORY	Serial Port 1	Serial Port 2	Clock	Printer Port	Game Port	Bus Extension
SixPakPlus	X	X		X	X	X	
MegaPlus II	X	X	X	X	X	X	X
I/O Plus II		X	X	X	X	X	
ComboPlus	X	X		X	X		
MP Expansion	X						

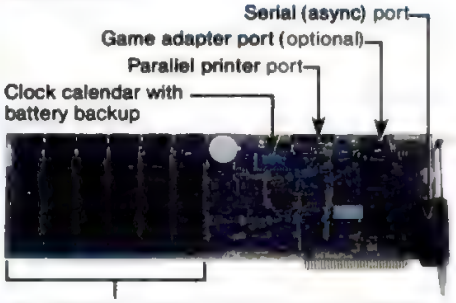
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AST Research Micro-to-Mainframe Communications Products:

- **AST-SNA** — A family of five products that enable a PC to communicate with a mainframe via the IBM SNA protocol without the use of protocol converters.
- **AST-5251** — An interactive 5251 remote work station emulation package for use with the IBM System 34, 36, or 38.
- **AST-3780** — A hardware/software package which allows an IBM PC to communicate with a mainframe in 2780/3780 bisync protocol.
- **AST-BSC** — A hardware/software package that allows your IBM PC to provide all the features of a 3270 or 2770 terminal in bisync.
- **CC-232** — A programmable card that allows an IBM PC to communicate in async, bisync, SDLC or HDLC protocols.

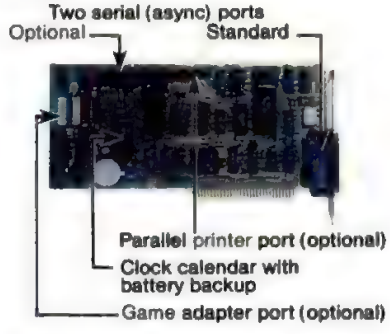


SixPakPlus™:

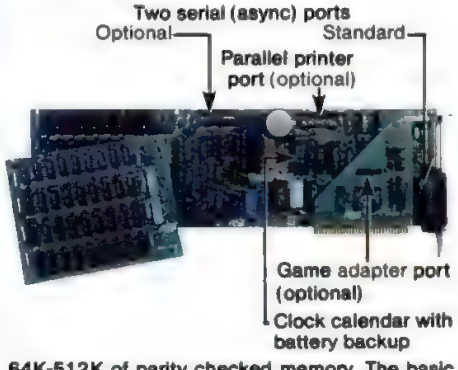


64K-384K of parity checked memory. Added to a PC or XT with a fully populated 256K system board, the SixPakPlus can bring the system memory to 640K, the maximum addressable user memory.

I/O Plus II™:

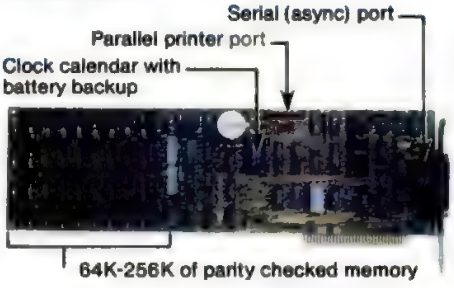


MegaPlus II™:



64K-512K of parity checked memory. The basic card expands to 256K, and with the MegaPak extension expands to an additional 128K or 256K of parity checked memory.

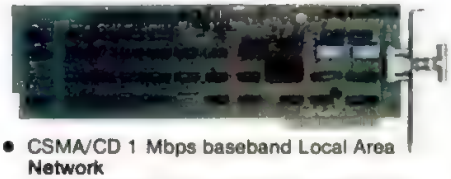
ComboPlus™:



MP Expansion Memory:



AST-PCnet™:



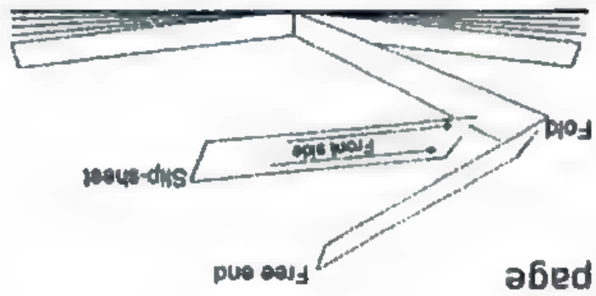
- CSMA/CD 1 Mbps baseband Local Area Network
- Uses standard 75-ohm CATV coaxial cable capable of running up to 7,000 feet
- Interconnects multiple PC's (57,000 addressable limit)
- All PC-compatible disk drives and printers are shareable
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- Users can execute commands remotely on shared PC
- File lock-out
- DOS 1.1 and DOS 2.0 compatible

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CIRCLE 154 ON READER SERVICE CARD

Inverted Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
    1. Front side touching the free page
    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet

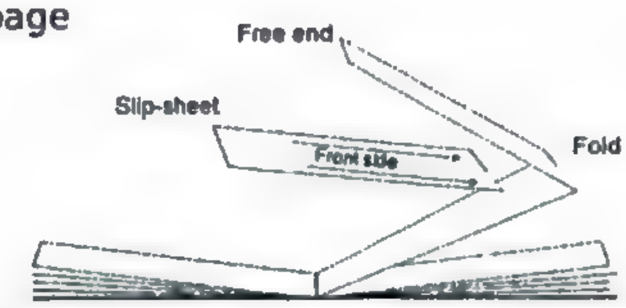


Folded edge of the page

GbsSlipSheet-001

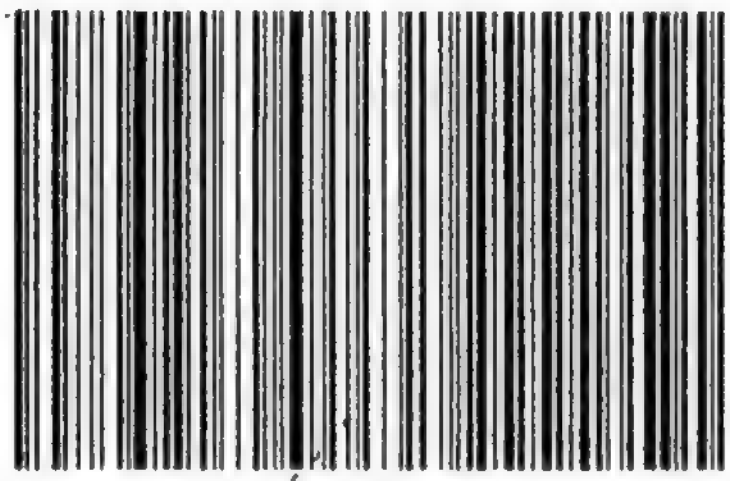
Foldout slip-sheet

1. Open the foldout page
2. Insert this sheet with
    1. Front side touching the free page
    2. Arrow pointing to the fold
3. Slice the folded edge
4. Close the page and slip-sheet



Inverted Back

1. Follow instructions on the other side



Back

1. Follow instructions on the other side

• **Parallel Ports** — The parallel port is used for connecting a parallel printer to your PC. A parallel printer typically uses a dot-matrix output which is suitable for high-speed draft quality printouts. The PC allows for the installation of up to three parallel ports.

• **Clock-Calendar** — With the on board battery, the clock-calendar feature will maintain the correct date and time, even when the PC is turned off. This feature eliminates the need for typing in this information each time you power up your computer.

• **Game Adapter** — The game adapter port allows you to connect an IBM-type joystick to your PC so you can play the multitude of arcade-quality games which take full advantage of the PC's graphic capabilities. Or you can use the joystick input for other applications by writing your own programs.

• **SuperPak™** — Every AST Research Multifunction Board comes with an AST SuperPak diskette containing programs for setting and accessing the clock, as well as SuperDrive™ and SuperSpool™, the most powerful RAM disk and print spooler available for PC-DOS. With SuperDrive you can use your PC's memory for simulating one to four floppy drives, from 20K to 360K each. SuperSpool allows you to set aside memory (from 4K to 512K) as a print buffer; SuperSpool sends output to the printer in the background while you execute your program in the foreground. With SuperDrive and SuperSpool, you can significantly improve your PC's operating speed.

• **Proven Compatibility** — All AST Research hardware and software products are 100% compatible with all versions of the PC and PC-XT as well as the Compaq and other PC look-alikes, and are 100% compatible with PC-DOS 1.1 and 2.0.

• **Warranty** — All AST Research products are backed with a one year limited warranty covering parts and labor with an optional paid second year warranty available.

Of course, all AST Research Multifunction Boards come with the **AST "PLUS,"** our unsurpassed reputation for quality, reliabilty, after-the-sale support, and overall design excellence which give our products the best price/performance ratio in the industry!



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point to the machines where we stop to unload the disks. If I'm right, the magnetic fields must extend a significant distance around the equipment.

To be safe, I take the following precautions: I put each box of disks in a lead-foil film pouch, although I am doubtful that this really offers protection against magnetic fields. More importantly, I carry backup sets of disks. This has allowed me to recover on all occasions.

One of our team members is convinced that some brands of disks are more susceptible to this kind of damage than other brands. Also, now that Compaq and others have transportable hard-disk systems, how will the hard disk react to airport X-ray systems?

I would appreciate any additional information on this subject.

Steven A. Green
University Heights, Ohio

There is a tremendous amount of conflicting information out there on the effect of X-ray machines and metal detectors on magnetic media. You are right in assuming that the magnetic fields are more likely to alter the media than the X-rays. The best magnetic shielding material is an alloy called mu-metal, and it is available in sheet form from industrial suppliers. A sheet steel file case would run a close second, but neither would do much good if the inspectors open them and remove the contents in proximity to the X-ray machines.

Some of us at PC *have traveled extensively while carrying magnetic media and have never encountered any problems. It is doubtful that brands of disks have much to do with it, even though magnetic coercivity varies from brand to brand. Hard disks are shielded somewhat by their cases, which are usually metal. We are interested in the experiences of our readers in this area.—Ed.*

The Apple of Your IBM

I enjoyed sharing the experiences of Winn Rosch with the Quadlink board installed in his PC ("The Apple Of Your IBM," *PC*, Volume 3 Number 3). I, too, have such a system and my transition from Apple to IBM has been as painless as possible. I have been able to convert Apple's *VisiCalc* and *MagiCalc* files, up to 90K, to IBM format through the use of the *Quadcopy* program. Further conversion to Lotus' *1-2-3* format allowed the original Apple data to be messaged and charted by *1-2-3*. This feature has been very valuable because it saves me from added work and data reentry.

My system performs as Rosch described except for one function: the use of the Ctrl-Alt-Del key combination to reboot in IBM mode not only reset the IBM, but closed communication to the Quadlink card. After that type of IBM boot, I can no longer switch to Apple mode by pressing Ctrl-Alt-A keys because nothing happens.

Do any other readers have this problem, and if so, how do they extricate themselves?

Stuart Meibuhr
Birmingham, Michigan

Readers, any suggestions?—Ed.

```
10 REM Copyright (C) 1983 Laurence V. Marks
20 REM This is MERGECLK.BAS  It may be used to copy the time and date to the PC'
s timer from BASIC or CASITA.
30 '-----------------------------------------
40 '  Put your key reassignments here.
50 '-----------------------------------------
60 KEY OFF:CLS
70 DEF FNT$(I)=RIGHT$("0"+MID$(STR$(I),2),2)
80 TIME$=FNT$(&H1203)+":"+FNT$(&H2203)+":"+FNT$(&HA03)
90 DATE$=FNT$(&H1E03)+"-"+FNT$(&H1A03)+"-"+FNT$(&H2603)+FNT$(&H2403)
100 LOCATE 5,35:PRINT "Hi there "
110 LOCATE 11,33:PRINT "on "DATE$;"."
120 WHILE INKEY$=""
130 T$=TIME$
140 MID$(T$,1,2)=RIGHT$(STR$(VAL(T$)-1),2) 'Omit this line for military
 time
150 LOCATE 8,33,0:PRINT "It's "T$
160 WEND
170 KEY ON:CLS:NEW
```

Real Time?

"Real programmers never program before 9 a.m."

Perhaps this statement is not true, so as the author of "Getting Set For Real Time" (*PC*, Volume 3 Number 4), I am a bit red in the face. One of the sample programs that I included with the article contains a statement that will display the incorrect time if you use your PC before noon.

The program MERGECLK.BAS shows how to use BASIC to copy the time of day from the battery-operated clock to the PC's timer. The program then loops, displaying the time of day on the screen. The copying process is performed correctly. However, the time displayed on the screen by statement 140 will result in an incorrect hours value. The purpose of this statement is to convert the time from the 24-hour to the 12-hour clock, and, unfortunately, it did not correctly account for cases before 12 noon.

I have attached a new listing (see below). The only line that has been changed is 140.

I apologize for any difficulty this error has caused your readers.

Laurence V. Marks
Rochester, Minnesota

Correction:

The correct name for SPSS Inc.'s new micro software system is *SPSS/PC*, not *Micro-SPSS*, as it appeared in the article "Crunching Numbers On A PC," *PC*, Volume 3 Number 2.

How to Write to PC

Do you have a comment, compliment, or criticism about something you read in *PC*? A question you'd like to open up to other readers? Send it to "Letters to PC," *PC Magazine*, One Park Avenue, New York, NY 10016. We are not able to answer letters personally.

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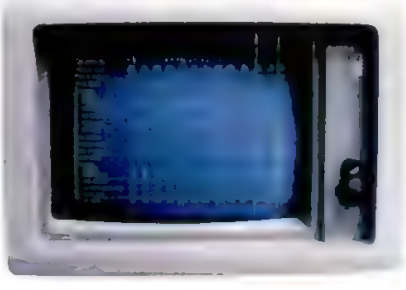


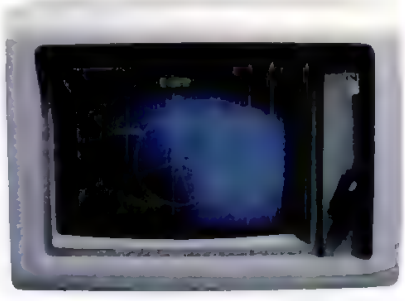
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Bit-mapped graphics	Standard (2 page)	Standard (2 page)	Option (1 page)
132-column x 44-row spreadsheet	Standard	NA	Standard
IBM display compatibility	Standard	Standard	Standard
Parallel port	Standard	Standard	Standard
Serial port	(2) Standard (one std./one opt.)	NA	NA
Clock/calendar w/battery	Standard	NA	NA
User-expandable (One option per UltraPAK board):			
IBM disk controller w/wo 256K memory	Option	NA	NA
384 K memory w/RAM drive	Option	NA	NA
IBM color/graphics* or high resolution color graphics* (640 x 400 w/16 colors)	Option	NA	NA

*For simultaneous display on a separate color monitor.

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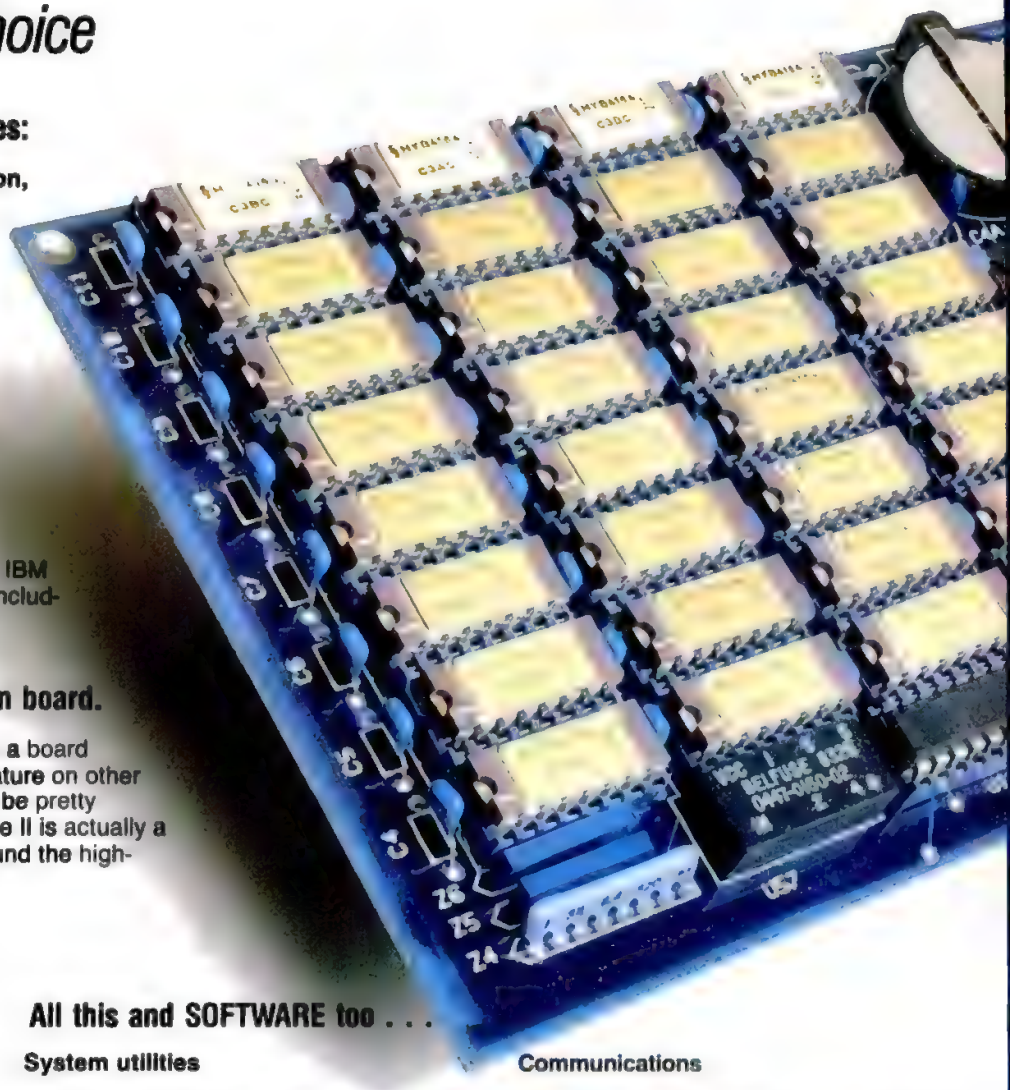
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With all that hardware to manage, we think a board should have a brain. You won't find this feature on other boards–they may look pretty, but they can be pretty boring once you get them home. Baby Blue II is actually a second computer inside your PC, built around the high-speed Z-80B microprocessor.

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- **Dual Ported Memory and I/O:** You can use Baby Blue II's memory, ports and clock as ordinary enhancements to your PC. Or, you can let our Z-80 microprocessor control the board directly, for truly independent background operation.

All this and SOFTWARE too . . .

System utilities

PDQ RAMdisk Software: create a FAST pseudo-disk drive of any size in available system RAM. The DOS 2.0 version lets you change the size of your RAMdisk from the keyboard.

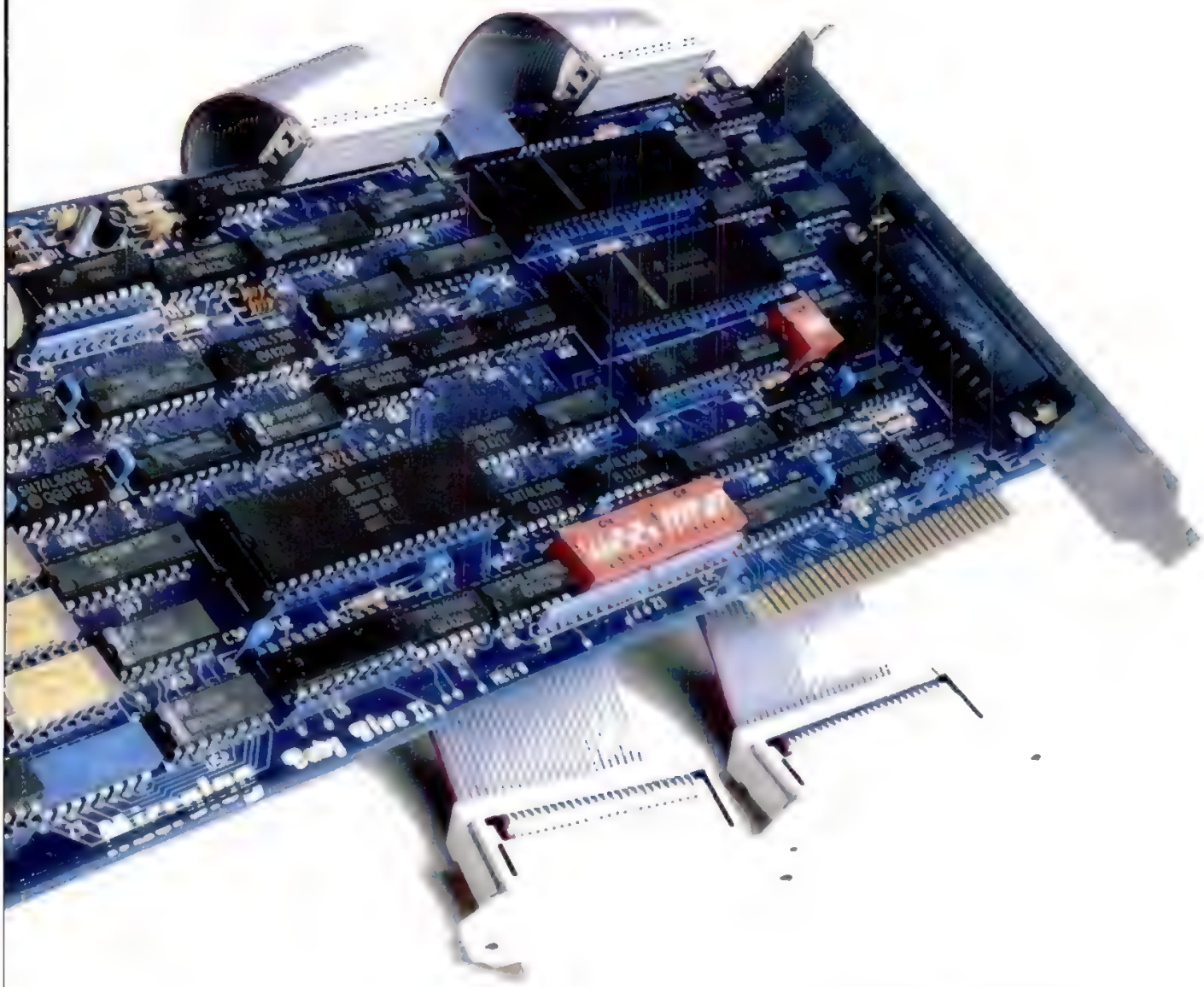
Print Buffer/Spooler: a TRUE print spooler: the Z-80 buffers and manages printing independent of your PC. Unlike other so-called "spoolers", this one won't stop your printer or slow you down when you start another job.

Clock Software: sets Baby Blue II's clock and initializes the system clock at boot time–never type the time and date again!

Communications

Smart Terminal Emulator Package (STEP): talk to other microcomputers or connect to larger host computers, as an asynchronous terminal through Baby Blue II's serial ports. Unlike other "smart terminal" programs, STEP offers full emulation of popular video display terminals (the standard package includes Televideo 950 and Hazeltine 1500. IBM 3101, DEC VT100 and many others are optionally available). You can send or receive text files, and with STEP's unique Sessions Menu, changing your configuration is a keystroke away.

BSTAM File Transfer Utility: Transmit and Receive text, HEX, and binary files (including .COM files) without errors and without fuss. BSTAM is easy to use, with all configuration parameters handled transparently under STEP.



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CIRCLE 516 ON READER SERVICE CARD

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The Half Card also operates in the PC, Compaq and other IBM compatibles

CIRCLE 464 ON READER SERVICE CARD

BSI Unveils "The Jack2 Challenge" Marketing Strategy

KINGS PARK, NY – Business Solutions, Inc. (BSI), unveiled today the long-awaited details of its multi-million dollar national marketing campaign for its new integrated software product, JACK2. Initial attention was drawn to the campaign by a series of "teaser" ads that recently appeared in THE WALL STREET JOURNAL.

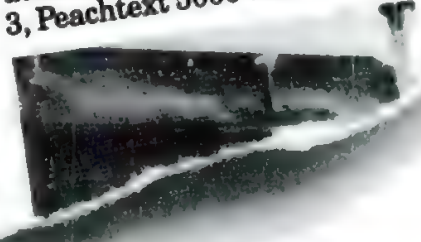
According to BSI President Alan Dziejma, the company has asked other software vendors to "put up their disks" in a series of national competitions, called "The JACK2 Challenges." The campaign is aimed at establishing JACK2 as the leader in second-generation integrated software.

JACK2 is the first integrated software product to do word processing, spreadsheeting, charting and data base management on the same screen at the same time without windows. In a recent SEYBOLD REPORT, which reviewed integrated windowing packages at Comdex/Fall, JACK2 was cited as one of the few new integrated packages providing "true interactive relationships."

"Real integration should allow users to turn on their computers in the morning – and without changing disks or systems – perform all their daily business tasks until they turn off their computers at night. And, they should be able to do this with no more effort than it now takes to do their jobs."

According to BSI President Alan Dziejma the firm is looking at a six-month window during which the winners of the integrated software competition will emerge. "We are taking steps now to assure our position in that market," noted Dziejma.

Dziejma revealed that The JACK2 Challenge will be audited and controlled by the independent accounting firm, Touche Ross and Company, with the press invited as on-hand observers. Touche Ross will also oversee the selection and training of graduate students from major business schools who will participate in the competition. The students will compete against JACK2 with products such as Lisa, Visi On, Lotus 1-2-3, Peachtext 5000 and others.



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Jack2



CIRCLE 124 ON READER SERVICE CARD

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- ☐ Please send me information on the Harvard study
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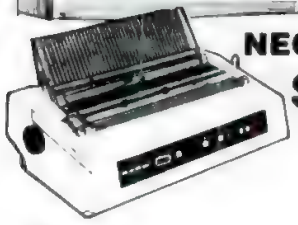
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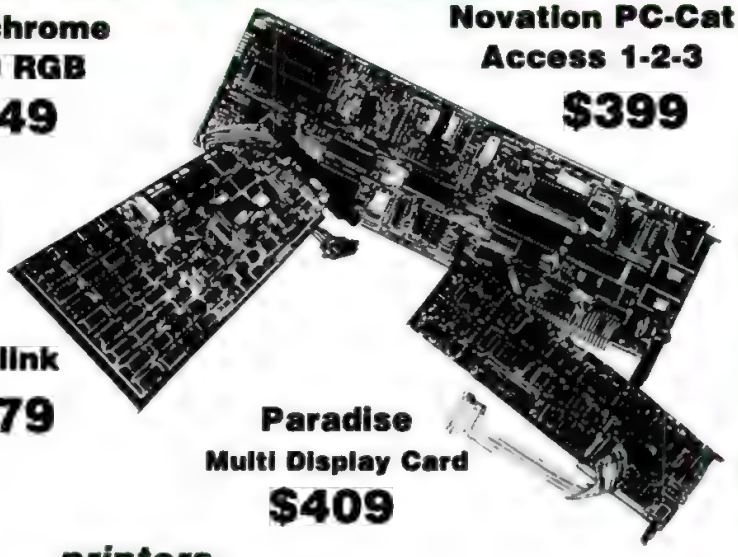
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Scarborough/Lightning, Mastertype		$ 40	$ 27
Sierra/On-Line, Ulthma II		$ 60	$ 40
Sir-Tech, Wizardry		$ 50	$ 39
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for the ATARI RANA 1000 Drive 320K		$ 449	$ 369
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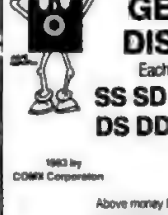
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10 ea DS/DD, 40T (IBM, H/P)	$ 75	$ 30
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10ea DS/DD 48T(IBM,H/P,etc.)	$ 89	$ 40
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Cat	$ 199	$ 139
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NEC, PC-8023A, FT 120cps, 80col para	$ 599	$ 430
PC-8025, 120cps, 136 col, para	$ 995	$ 775
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OKIDATA, 82A 80 col 120 cps, para	$ 349	Call
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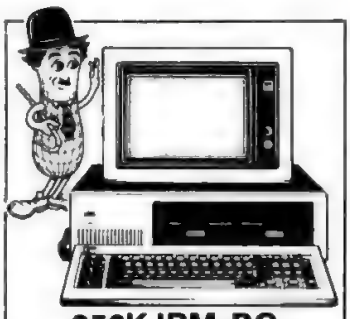
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• Quadlink NEWEST VERSION	$ 680	$ 485
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Microfazer w/copy PP 64K #MP64w/PS	$ 319	$ 219
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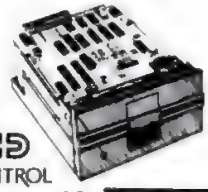
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Lovers and Other Computers

Artificial intelligence is no longer news, but what about artificial emotion? What are the possibilities and consequences of computers functioning as companions instead of mere tools?

I love having my own personal computer, but lately I have begun to worry that it may become too personal. I wasn't concerned about this until I read that one day computers will actually become our "friends and lovers." That is what author G. L. Simons wrote in his book *Are Computers Alive* (Birkhauser, 1983), and since he is an expert in the field of artificial intelligence, I assume he knows what he is talking about. I've more or less adjusted to the concept of artificial intelligence, but now it looks as if I'll have to get used to the idea of an artificial lover, too.

There is something about the prospect of programmed passion that blights my romantic impulses. The problem lies in the word *artificial*. Whatever else computers may be, they are fundamentally artificial. The characteristics that make them suitable for so many tasks run contrary to those that we seek in a human lover.

Nonetheless, there are certain issues to consider. Take boredom. Computers never get bored; they can repeatedly process routine data and elegant equations with nary a yawn. And admittedly, we would all like to have a lover who never gets bored. Why couldn't we use artificial intelligence to produce one? After all, the reason we create things like computers is so we can categorically exclude such undesirable behavior. The goal of technology has always been to get a machine to do what human beings find dull or degrading. But can we replace human lovers with more desirable artificial ones?



Dennis O'Brien

Since a computer is a machine, we ignore the moral considerations that are essential to interacting with human beings. But is a lover who never gets bored, one who has been mechanically rid of all undesirable behavior, actually superior to a human lover? This notion raises the question of whether true friendship can be offered by a machine that by nature lacks all possibility for moral virtue. Having considered these questions, I find the very idea of producing artificial lovers inconsistent.

This argument will not satisfy Simons and like-minded enthusiasts. They argue, absurdly, that computers can be created with a true capacity for choice and feeling. But even if this were possible, wouldn't these artificial versions be just like their human counterparts? Our search for an artificial lover must yield a genuinely better product. If it doesn't, the effort has been wasted.

This is where Simons gets into deep water. First of all, a superior lover must be more than an unfailing performer. He must have the innate capacity for fraud and betrayal. If only our synthetic friends *could* fail—but consistently would choose not to—then they would earn our unquestioned loyalty.

Humility is part of the picture, too. Unlike the search for truth, which excludes all error, the search for love and compassion requires a tremendous tolerance for failure. In the realm of intelligence, superiority rightly asserts itself, but in the realm of morality and emotion, superiority may demand a humble disguise. So, even if a microchip whiz could create a truly superior lover, the inventor might never recognize such superiority. The gadget would morally demand to share the life of the fallible. In sum: You may love your computer, but I hope it never starts loving you back. ■

Dennis O'Brien is the president of Bucknell University.



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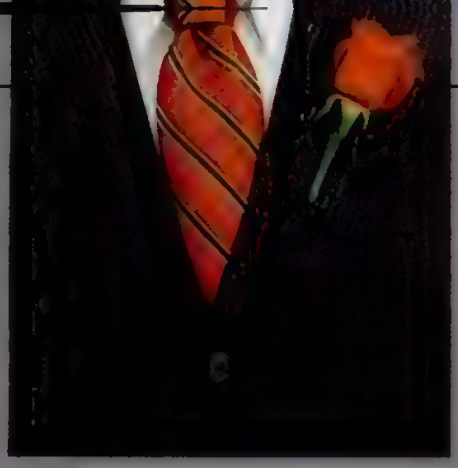
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We benchmarked the nearest approximations, the Silver-Reed EXP 550, the Brother HR-1, and the Smith-Corona TP-1. Good products all. But then we put the Juki 6100 through its paces against this checklist:

1. Print Quality. This is where it really shines. Our printer uses print wheels and ribbons designed not for computer printers, but for *typewriters*—where the standards for "letter quality" are set. The printwheels are Triumph-Adler style: true typewriter quality, because that's what they were designed for. What's more, the printer uses IBM's Selectric II typewriter cartridges, so enough said about quality of the ink and the print impression. Chances are you already stock these cartridges in your supplies cabinet.

2. Print Speed. Using the standard Shannon test for plain text, the Juki does a true 18 characters per second. That exceeds all three rival printers, and is half again faster that the Smith-Corona. But there is more. The Juki designers put in logic-seeking bi-directional printing and high speed motion over blank spaces. This means that typing speed on typical text is as fast as printers with much faster ratings. And there is a built-in, expendable 2,000 character buffer in the printer to free up your computer even before the printing is done.

3. Noise level. Quiet level is more accurate. The technical rating is better than 62 dBA from 1 meter away. If you don't know a dBA from a D&B, it means no raucous clatter to rattle the nerves, a big improvement over some printers we listened to. The other three are *two to eight times noisier.*

4. Reliability. The engineers know what an MTBF of 2500 hours at 25% duty means. More meaningful for most of us: there are very few moving parts. Other printers employ a complex system of electric motors, wires pullies, and springs. Not only do they break down, they also go out of adjustment. But the Juki uses a far more elegant design: the printhead glides across a rail by magnetic traction. That's all there is to it. If you look inside, you will see a startling simplicity.

5. Warranty. We give you a full 90 days limited warranty which covers parts and labor, but we don't think you'll be testing this part of our offer. Still, it's nice to know it's there. It means you really cannot go wrong by ordering this printer to put it through its paces.

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6. Versatility. Our printer can print at 10, 12 and 15 characters per inch and also take proportional spaced wheels for that extra touch of class. We also have an economical and reliable bi-directional forms tractor as an option, if you want to handle continuous stationery.

We supply a 100-character Courier 10-pitch (characters per inch) printwheel with the full ASCII character set and extra word processing symbols. The other three printers can't match that: Smith-Corona has only 88.

7. Physical Specifications.

Print Speed:	18 characters/second
Daisywheel:	Triumph-Adler compatible. Drops into place
Printing Characters:	100 per wheel
Printed Line Length:	110 characters under 10 pitch 132 characters under 12 pitch 165 characters under 15 pitch 82 to 220 characters under proportional spacing mode
Horizontal Resolution:	1/120 inch minimum
Vertical Resolution:	1/48 inch (1/96 inch possible by using escape sequence)
Platen Size:	13 inches (Printing line 11 inches)
Ribbon:	IBM82 Compatible multi-strike or single strike (Selectric II)
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Power Consumption:	40 W idling, average 80 W printing
Dimensions:	Width: 20.5", Depth: 17.9", Height: 5.9"
Weight:	31 lbs.
Environment:	Ambient Temperature: 41° to 95° Farenheit Relative Humidity: 30% to 85%
MTBF:	2,500 hours at 25% duty
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Noise:	Less than 62 dBA at 1 meter distance
Buffer Memory Size:	2K bytes installed, expandable to 8K.
Options:	Bi-Directional Forms Tractor, $129.00

8. Ease of Installation and Use. The Juki is fully compatible with your IBM PC or XT. Just plug it into the parallel printer port. And it works with the top-selling software products: the Juki follows standard Diablo® protocols.

- It's exasperating to be all set to go—but no ribbon. So we give you a ribbon. Loading is clean and simple—it's an IBM Selectric style cartridge, remember.
- We also give you a printwheel: a courier 10 (characters to the inch), the most popular typeface. The fun comes in loading it: just pull back a lever, and **drop it in**. No cover or ribbon removal, no inky fingers. No figuring out why it doesn't attach. It drops into a recess and the printer engages it entirely on its own!

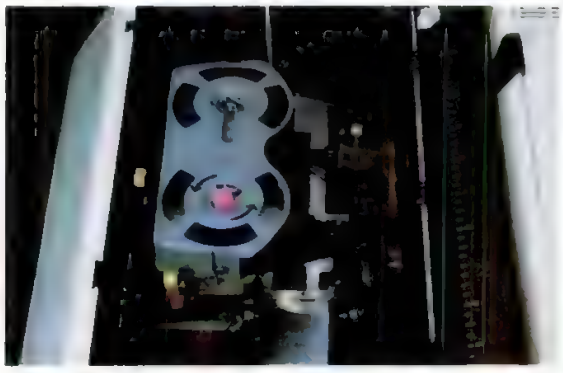
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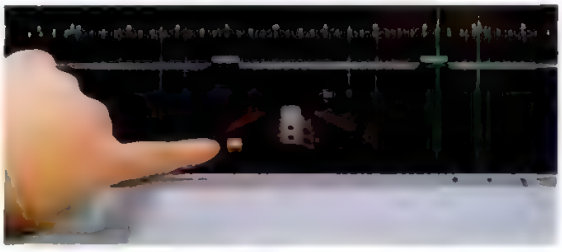
PC Brand has printwheels and ribbons for the Juki 6100, and a range of personal computer supplies. Ask for our catalog. Prices and specifications are subject to change without notice.





Above: Easily accessed controls are on the front panel. The printhead, ribbon, and printwheel are mounted as a single mechanism. Below: The printwheel simply drops into place; the printer engages it automatically!





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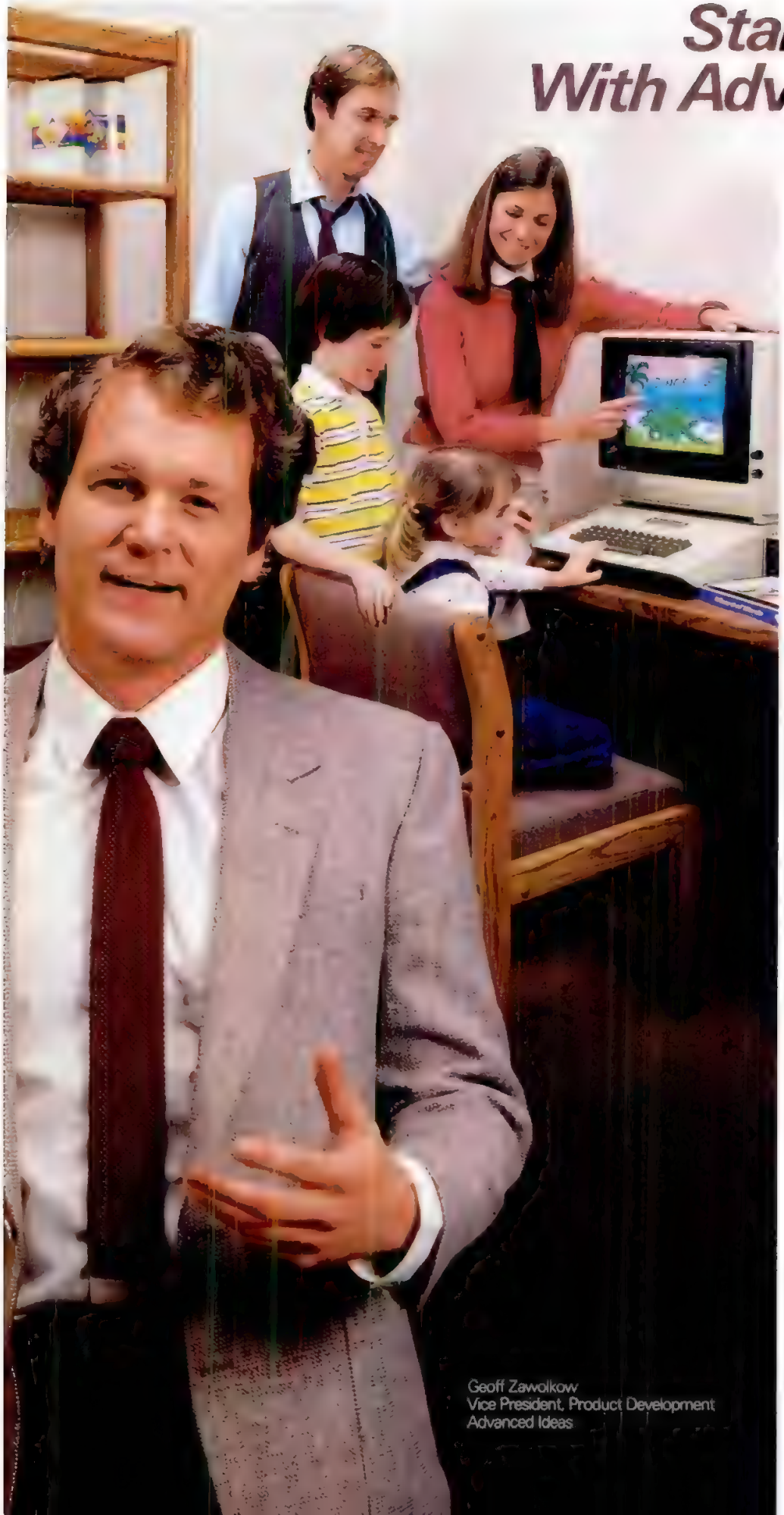
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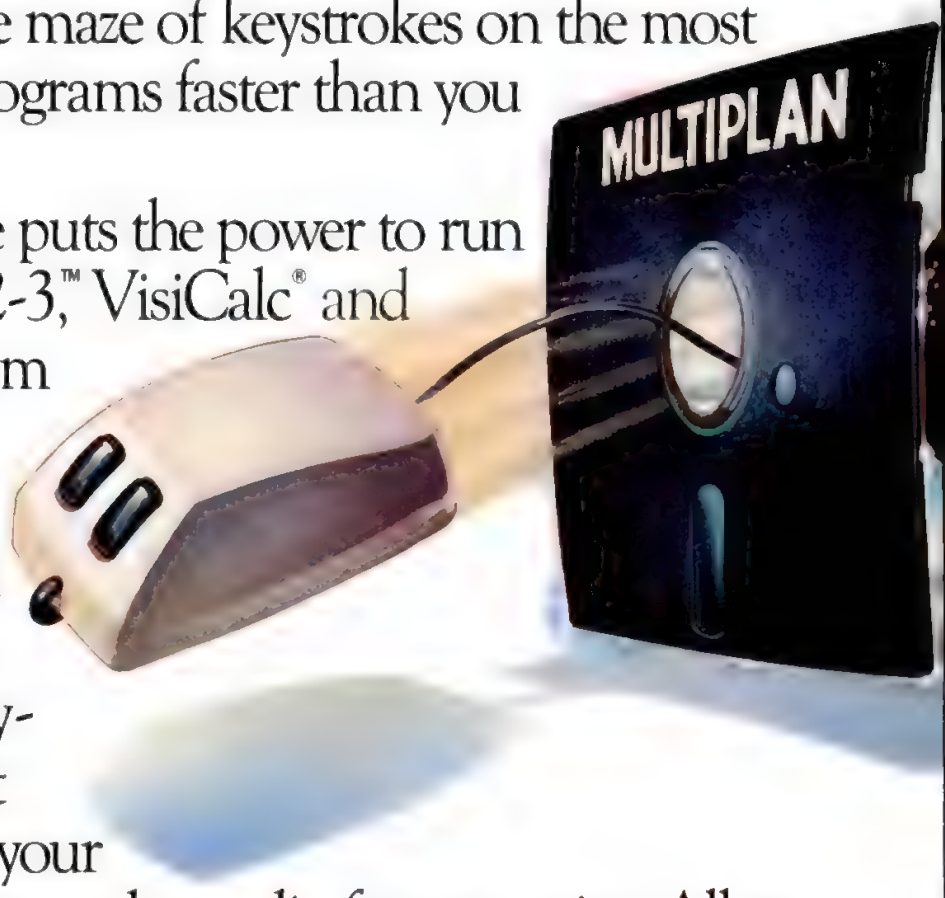
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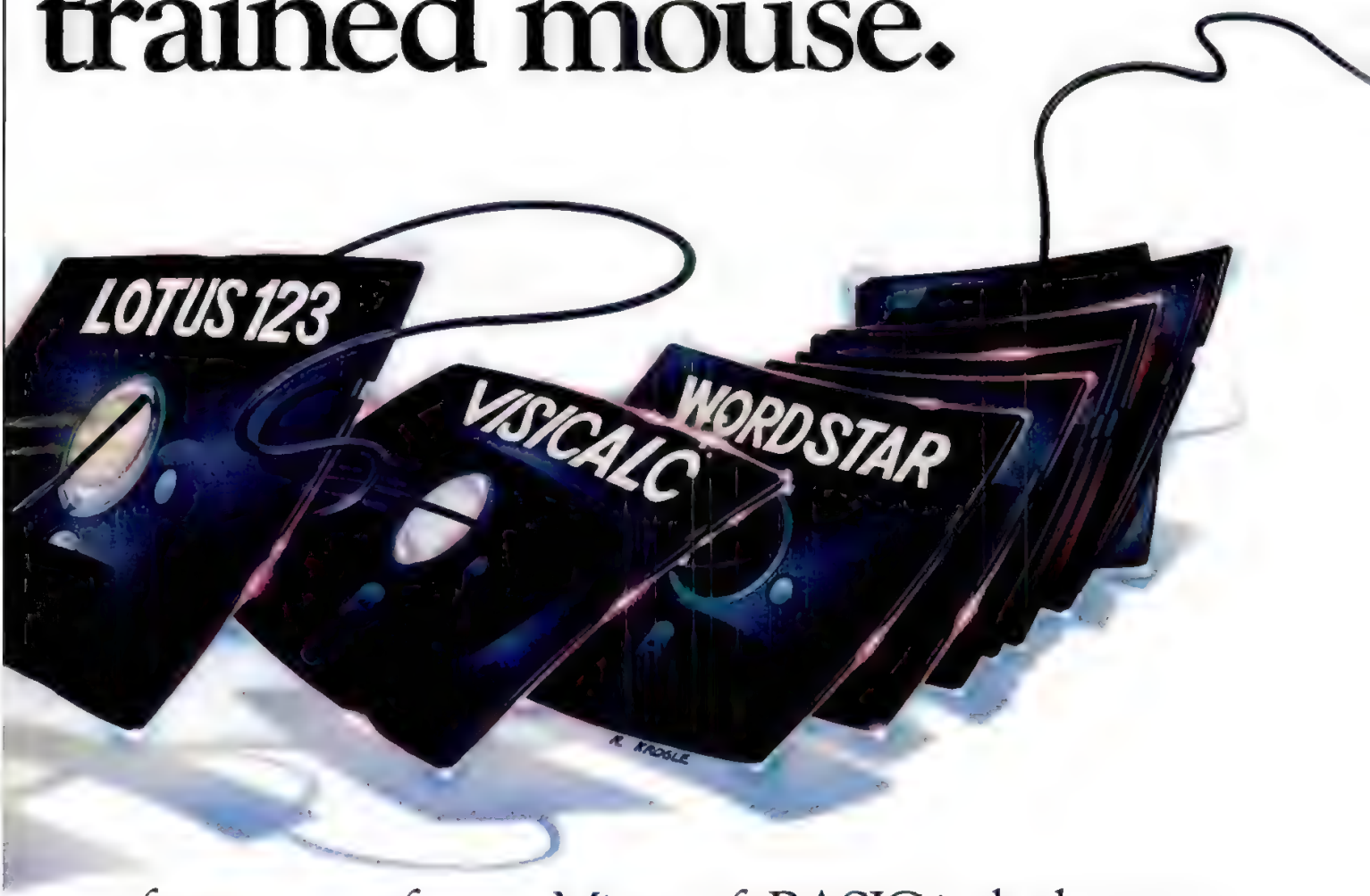


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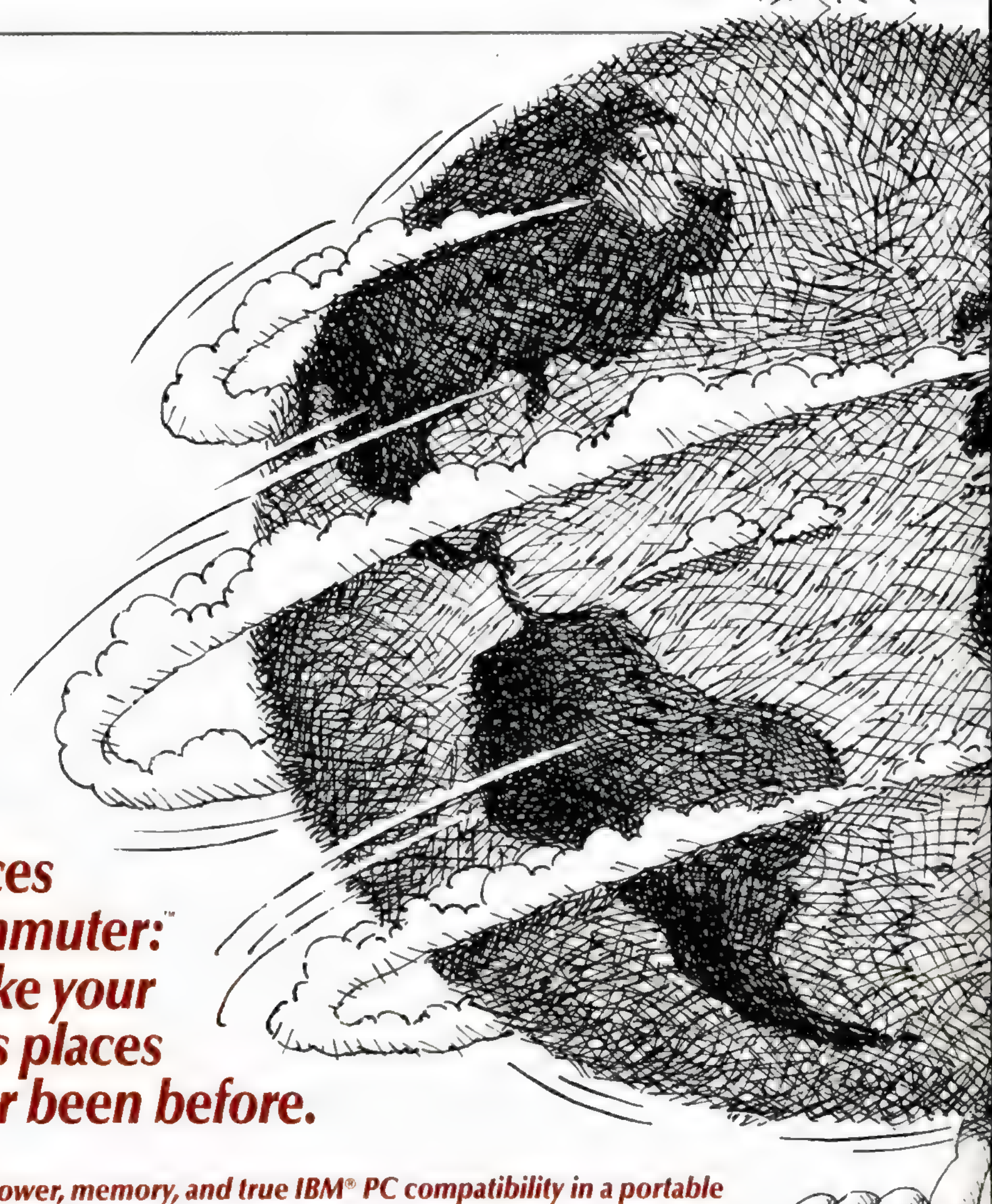
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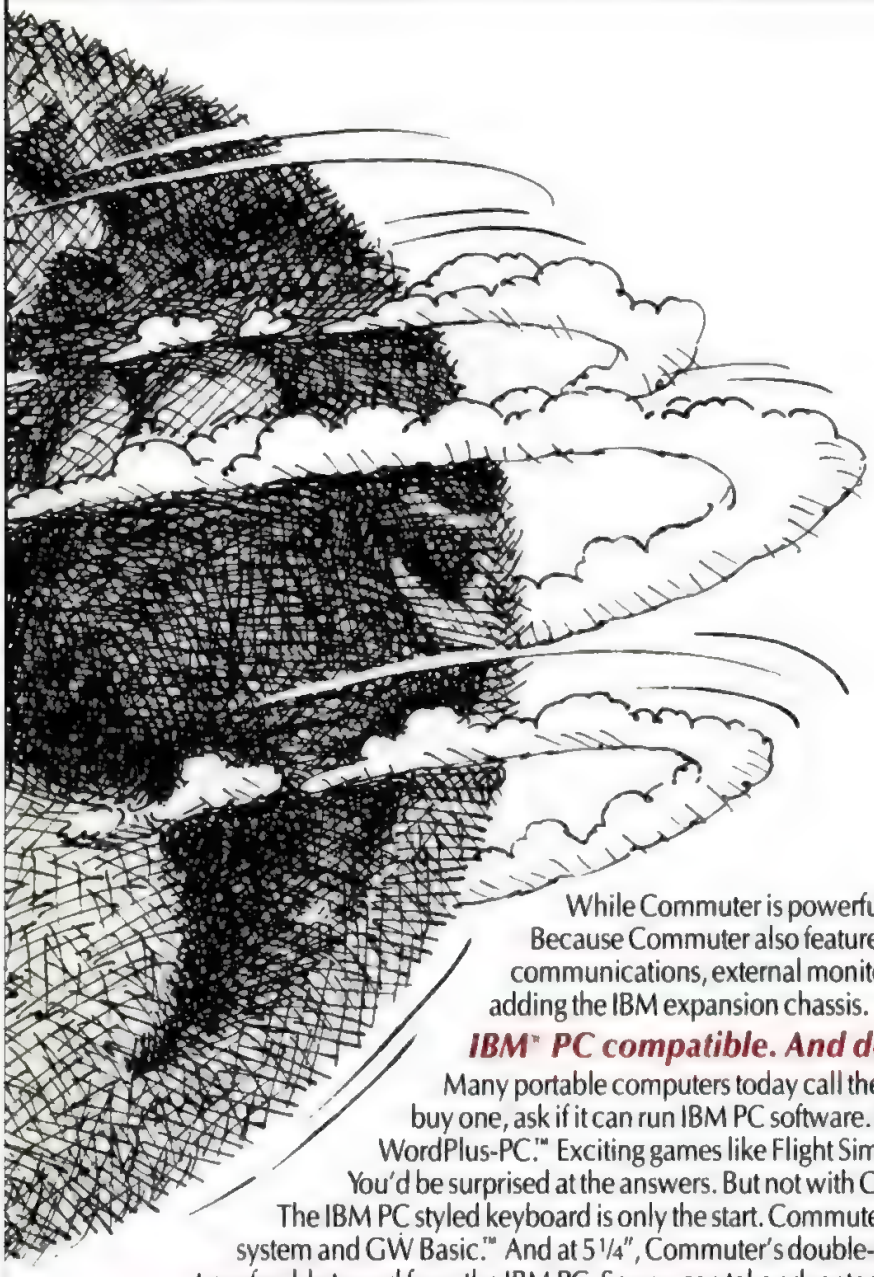
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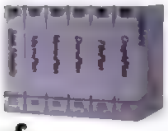


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Keeping Subdirectories Simple

Subdirectories can be very helpful aids, but the best approach is the simplest one. If your file structure gets too complicated and overgrown, you could miss the forest for the trees.

Lately we've been chewing on the meaty subject of subdirectories on disk, a feature of DOS 2.0 and 2.10 (the version introduced with the PC*jr*). We have already looked at just what subdirectories are and how they work, and at the two commands that are essential to using subdirectories: CHDIR (also known as CD) and PATH.

It's both interesting and intellectually satisfying to have a technical understanding of the ins and outs of such a complicated subject as subdirectories, but that isn't the only reason for taking such a close look at them. We've been laying the groundwork to start building some practical tips on how to use subdirectories. Now we'll focus on what kind of subdirectories to create and what to put into them.

Let's start with the simple stuff. First, who are subdirectories for? Almost exclusively, they're for people who use XTs or other systems that have fast, high-capacity hard disks. Under most circumstances, subdirectories aren't useful on floppies. The extra work DOS goes through to use subdirectories is worthwhile on a fast hard disk, but on a floppy, the process is painfully slow. In addition, diskettes don't hold enough files to make subdirectories useful. So the first tip is to forget about using subdirectories on floppies.

What are subdirectories for? They are for separating files into distinct groups.



Peter Norton

We'll get into some of the most useful ways to group files, but for the moment let's make sure this one small point is perfectly clear: Subdirectories are for dividing our files into groups—and nothing else.

Out on a Limb

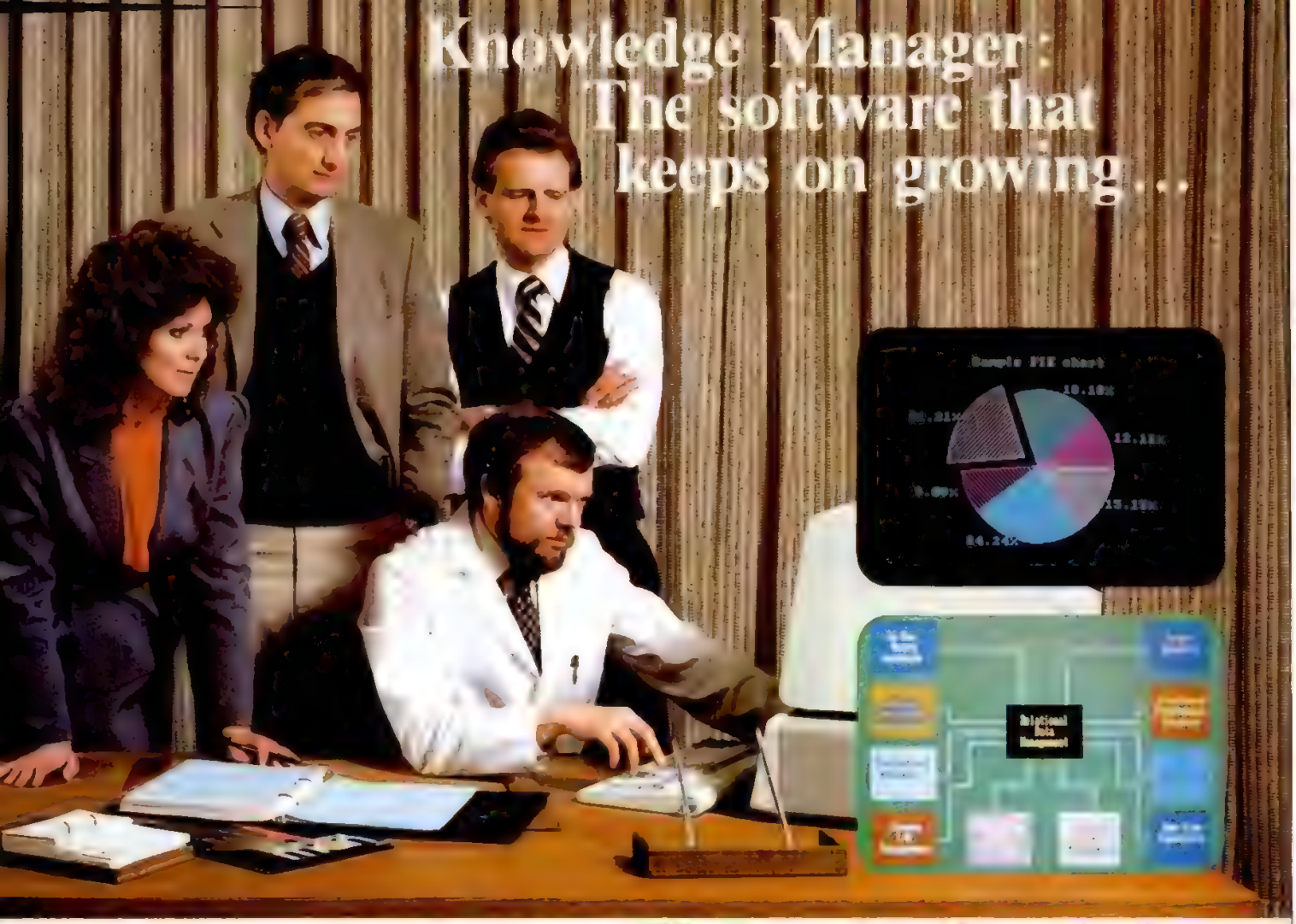
What about the directory tree structure? Should you put subdirectories under subdirectories? Only if you like to suffer. The concept of using a complex tree structure is appealing: We logically group our files in master subdirectories and subsidiary sub-subdirectories. We build a tree structure to match the logical relationship of our files. Sounds great, but it doesn't work well.

There are two main problems with using a complex tree-structured directory. There's a performance problem: DOS has to do a lot more work to thread its way through all that foliage. There's also a human problem: It's a lot harder for us to keep track of our directories when we've got subdirectories under subdirectories. Although the TREE command is there to help, it's of little assistance (and of all the elements in DOS, it's the most poorly engineered; IBM wrote it, not Microsoft).

Here's a practical tip to help overcome these limitations: Put all your subdirectories under the disk's root directory, not under one another. If you don't think you will be able to make sense of your many subdirectories without putting them into a tree structure, you're probably climbing out on a limb. Make life simpler for yourself.

Putting all your subdirectories under the root directory is one practical way to help you keep track of them; giving them distinct names is another. I highly recommend that you establish a distinct signature for subdirectory names. For instance, give all your subdirectories the same filename extension such as .DIR, or .SUB. I give my subdirectories a blank extension. Whatever you choose, if all your subdirectories have the same distinct filename extension, then you can easily call up a list

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of all of them with a command like this:

```
DIR \*.SUB
```

If you'd like to have them sorted alphabetically, use a pipeline command like this:

```
DIR \*.SUB | SORT | MORE
```

I have devised a system to easily call up the subdirectory list; I put the pipeline command shown here into a batch command file named DD.BAT. That way, by entering DD (Display Directories, as I call it), I get a sorted list of my subdirectories. At the moment I have 26 subdirectories, and this batch command helps me keep all of them straight.

That's the simple stuff. Now let's move into the more complicated areas. The real question at hand is how to group your files into subdirectories and then how to work with them. The way in which we set them up is closely related to how we will work with them.

Keep it Simple

The first rule is to subdivide as little as possible. Put everything that you don't really need to separate out into one catchall directory, such as your disk's root directory. This would include all the standard DOS programs and any miscellaneous programs that you don't need to keep track of separately. My root directory, for example, has 145 files in it; almost every program I have is in there. I don't need to look at them; I just want them working for me. So I stick them all into my root directory and forget about them. Remember that the PATH command keeps the programs in your catchall directory on tap at all times. My catchall directory is the root directory of drive C. I keep the PATH command set to C:\, which provides me with immediate access to every program I have stored in there, no matter what drive or subdirectory I've wandered into.

Your catchall directory is dedicated to holding everything you never want to see. The catchall should be filled with programs that you use but that you, for the most part, wouldn't need a list of. The catchall directory is a convenient place to dump things that you don't need to keep track of; subdirectories, on the other hand, are what you use for things that you do need to keep track of.

When you have programs separated out into subdirectories, use the PATH command to make sure that they are on tap at all times.

Next rule: Some programs deserve their own distinct subdirectories. When they do, separate them out from your catchall directory. When is this a good idea? I can think of a few cases. When you expect to have more than one version of a program—such as an income-tax program for which you'll be getting yearly updates—you want to keep both the new and old versions. Distinct subdirectories help with situations like this. When a series of programs works together and you want to be able to see a list of them to remind you of their names, having a tight little subdirectory of all the programs in one working system makes it easier to use them. For example, I keep my accounting system in a subdirectory and I can quickly remind myself of all the program names with the command

```
DIR \GL\*.BAS
```

(BAS, because the programs are written in BASIC.)

Here's another example that will give you an idea of when it's good to put programs into a catchall directory and when it's not. Occasionally I have a chance to snoop around on someone else's XT, and I often find that they have my Norton Utility programs on a separate subdirectory. At first I thought that this was dumb; now I realize that it's smart. I know those programs by heart so I don't have any trouble keeping track of them. For me, they belong on the catchall directory where I can use them, but ignore them. For someone else, who uses these programs but doesn't know them by heart, having them in a separate subdirectory makes it easy to take a quick peek at them. With those programs in their own subdirectory, a command like this:

```
DIR \NORTON
```

produces a quick review of the program names, which is a real help.

Programs on Tap

Whenever you have programs separated out into subdirectories, use the PATH command to make sure that they are on tap at all times. For example, let's suppose that your catchall is the root directory of your hard disk, drive C, and you've got two program subdirectories, NORTON and C-TOOLS. In addition, you load some programs into a RAM drive (drive D) for faster access. Here's your ideal PATH command:

```
PATH D:\;C:\;C:\NORTON;C:\C-
TOOLS
```

There is one more situation in which it really makes sense to separate out programs into their own subdirectories: when the programs use their own data files in addition to the files that we want them to work on. Examples of programs like this are spelling checkers, which use dictionary files, and sophisticated programs like Lotus *1-2-3* or Microsoft *Word* that read program overlay files and also use initialization or profile files. Programs like these create a special situation that complicates our work.

The issues here revolve around the problem of connecting our data to their programs. This, in itself, is a fascinating subject, and we'll dig into it, with some batch file tricks, in my next column. ■

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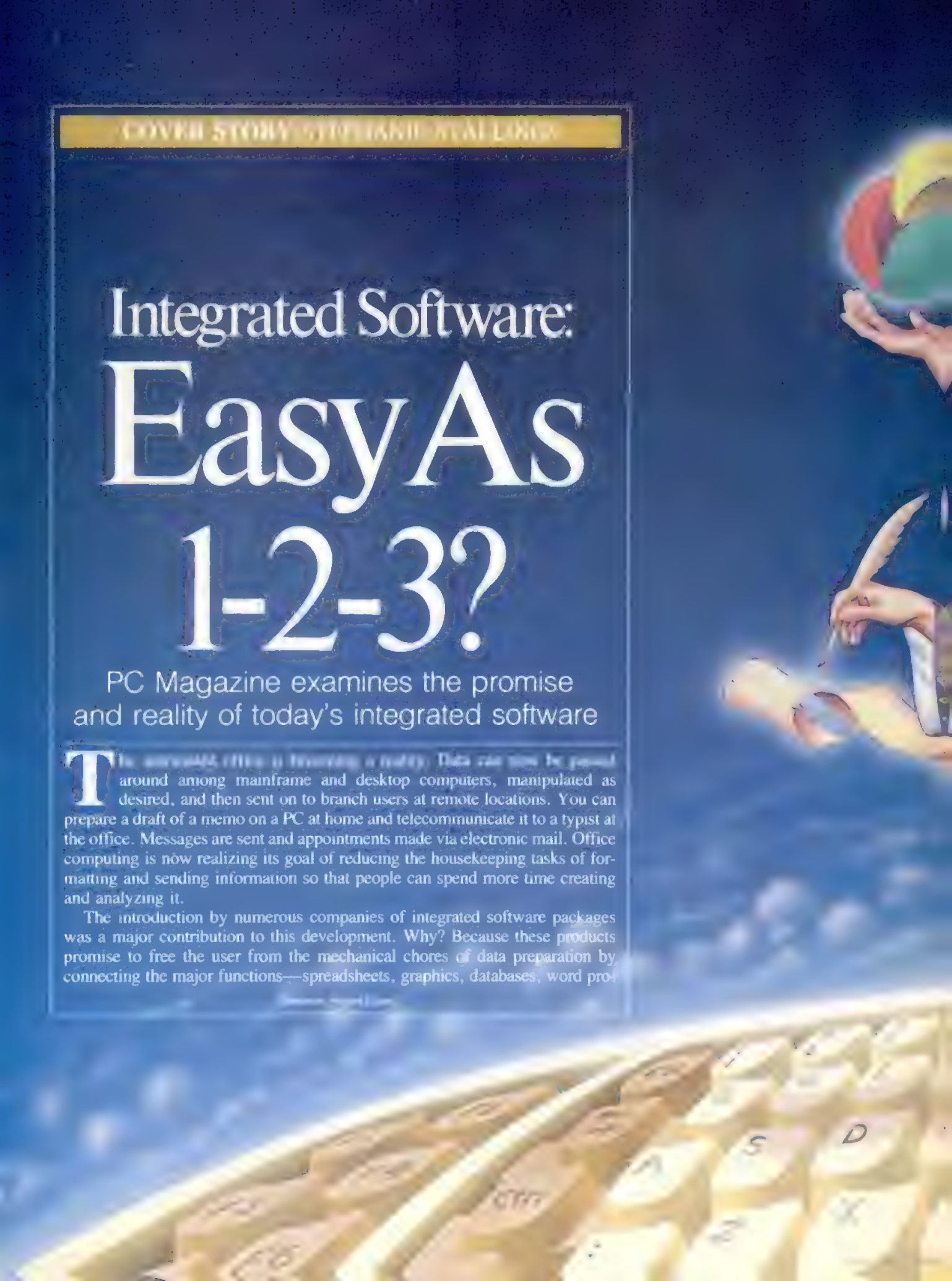
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Integrated Software: Easy As 1-2-3?

PC Magazine examines the promise and reality of today's integrated software

The [illegible] office is becoming a reality. Data can now be passed around among mainframe and desktop computers, manipulated as desired, and then sent on to branch users at remote locations. You can prepare a draft of a memo on a PC at home and telecommunicate it to a typist at the office. Messages are sent and appointments made via electronic mail. Office computing is now realizing its goal of reducing the housekeeping tasks of formatting and sending information so that people can spend more time creating and analyzing it.

The introduction by numerous companies of integrated software packages was a major contribution to this development. Why? Because these products promise to free the user from the mechanical chores of data preparation by connecting the major functions—spreadsheets, graphics, databases, word pro-





cessing, and, occassionally, communications—so that the user can work with the same material in any form. The integration of these functions is designed to eliminate the need to do such things as strip headings off of a file before loading it into a spreadsheet program, and pass spreadsheet data to a separate graphics program. These integrated programs combine text and graphics in a single document and perform database operations, such as sorting and extracting, on data that is then viewed on the spreadsheet.

Since the advent of Lotus' *1-2-3*, so many companies have released some kind of integrated package that you can't thumb through five pages of *PC Magazine* without seeing another advertisement promising to relieve you of the frustration and tedium so often associated with the combined manipulation of data and text. So *PC* decided to evaluate the status of integrated software packages today. We reviewed each of the most significant packages separately, focusing on the transition among the various functions, to determine how much effort integrated programs can save.

We were also interested in whether the individual functions of various integrated software packages compete with one another. To test this, we performed side-by-side comparisons of the four major functions of the five largest packages, *1-2-3*, *SuperCalc*^{3}, *VisiCalc IV*, *SeriesOnePlus*, and the IT series.

Basis of Comparison

Throughout our reviews, the basis of comparison was Lotus' *1-2-3*. We wanted to see how the other programs met the challenge that *1-2-3* has presented, and we were interested in finding out if any of them had a chance of surpassing the front runner. In order to understand why *1-2-3* has attained its preeminent position, we've attempted to hook it to other software packages, and we've taken it to the limit to generate full-fledged business applications. However, even *1-2-3* doesn't do everything you might want it to do, so an experienced computer user has put together a wish list to whet your appetite.

Our evaluations, to no one's surprise, led us to the conclusion that there are as many definitions of software integration as there are integrated software manufacturers. To some companies, integration means that the same data are available to the spreadsheet, graphics, and other functions; indeed, the functions are just different ways of looking at the same data. On the other side of the fence are those software packages that have as their main program a control module that connects the separate function programs. With some designs, the programs for the separate functions must have the same brand name as the control module, whereas others can use any of a number of brand-X programs. This setup usually requires a procedure to pass the data among the programs.

Some of the software packages that use integrated functions to look at the same data in different ways are *1-2-3*, *SuperCalc*^{3}, *VisiCalc IV*, and *METAFILE*. These programs use a series of commands to indicate which function should be applied to the data. The simplicity of this method is persuasive. The user doesn't have to know how to transfer files between programs nor be concerned about matching file formats. The software package can be viewed as a single black box, which, with a few simple commands, will do the user's bidding. And since this box contains the whole package, your choice of which command to use is not complicated by the choice of which component should go with the control program. Our writers will tell you how easy or awkward this method proved in reality.

The Master-Program Approach

SeriesOnePlus and the IT series take the opposite approach, providing a main integrator program that is in charge of incorporating the function programs into a unified whole. *SeriesOnePlus*' Execu/BUS is the master program from which the other programs can be accessed, and the function programs must be chosen from among the 12 in the Executec series. The IT series, in similar fashion, consists of ten programs arrayed around the database manager, *KeepIT*. *KeepIT* is also said to be able to incorporate function programs from other manufacturers. The advantage of using the manufacturer's own programs is that the menus and commands have been standardized throughout. But being able to use a competitor's package means not having to buy a new one. Manufacturers who have chosen this approach say it lets them make each function as fully formed and powerful as a standalone package. The results can be seen in the reviews.

While all of these products promise some integration, they still divide the work process into the conventional separate functions. *T/Maker III* and *Desq* have left it up to users to decide how to functionalize their work. *T/Maker III* allows you to combine text and spreadsheet on the same screen. *Desq*, while it supports off-the-shelf applications, emphasizes its windowing capabilities.

A finding that did surprise us is the extent to which advertising precedes the software into the marketplace—or even into concrete existence. A press release from one company claimed that sales for its integrated package had exceeded $1,000,000, yet the software wasn't completed in time to be evaluated for this issue. We sympathize with the need for companies to seek a competitive edge, but a brilliant promise that remains unfulfilled begins to have about as much weight as a campaign pledge. We call these products vaporware; we can't get our hands on them, but they still cloud the picture.

We are enticed by the promises, though, and hope to see some of the 13 new integrated software packages over the next few months, including *Jack 2* by Business Solutions, Inc.; Mosaic Software's *Integrated 6; Corporate MBA*, put out by Context Management Systems; and Ovation Technologies' integrated software package. And we're looking forward to reviewing Lotus' new *Symphony*. ■

1-2-3 Links Arms With Business

Users are solving their business problems with 1-2-3 by combining its many features to create new systems.

One of the most fascinating intellectual concepts is that of synergy, the combining of individual elements into a whole with new qualities that are not intrinsic to the separate parts. *1-2-3*'s smoothly designed worksheet commands, specialized calculation functions, and well integrated spreadsheet and graphics capabilities can be combined to create powerful business applications that are more than a simple collection of *1-2-3*'s separate features. Here are some of the areas in which *1-2-3* users are developing these synergistic applications.



Financial Planning

Financial planning is common use of *1-2-3*. Financial analysts can take full advantage of *1-2-3*'s features to run financial forecasting models through many permutations and to clarify numerical data with complementary graphics.

Financial forecasts often require historical data in order to be accurate. *1-2-3*'s large worksheet of 254 columns and 2,048 rows makes it possible to include this vital background information in a financial analysis. Such modeling would take time, even on an IBM PC, without a means of specifying the range of cases to be tested. In *1-2-3*, this case-testing is done using the data table feature.

A data table allows you to test the results of a formula with any number of input values. It is an easy and fast way to make profit and loss forecasts for a company. Suppose you want to forecast profits for the next 5 years, assuming a growth rate of 5 percent per month. The key question is whether or not it is possible to achieve 5 percent monthly growth. Using *1-2-3*'s data table, you can test every case between zero and 15 percent monthly growth and determine how those rates affect total profit at the end of 5 years.

Down the left side of the spreadsheet, list the rates between zero and 15 percent. Next, designate an input cell where each of the rates will be placed when you make the growth rate calculation. You also must designate a formula for the data table referring to a cell on the right side of the spreadsheet where total profitability for the 5-year period will be calculated. When you have set this up, hit F8, the "table" key, and *1-2-3* will run for perhaps 30 minutes, making a series of calculations. When the calculations are completed, each total profit figure will be

stored next to the rate that generated it. This use of data tables enables you to do 3 or 4 hours worth of analysis in a short time.

Doing this analysis on the IBM PC rather than on a mainframe computer saves money as well as time: the cost of running a PC is low compared to the hourly rates for mainframe use. And *1-2-3*'s ability to display percent signs will give the resulting report a more finished look.

This profit and loss forecast doesn't have to stop with the report listing the figures. You can create accompanying graphs by entering just a few commands. In the old days, perhaps 5 years ago, graphs were done by the corporate art department, which could easily take several days to complete them. Software which allows you to make calculations in one program and then pass the data to another program to be plotted reduced this time considerably. However, if you wanted to go back and change a calculation, then look at the new graph, you would have to repeat the whole process.

Using *1-2-3*'s graphics capabilities and, ideally, both a color and a monochrome display, you can view the numbers on the monochrome display while looking at the graph on the color monitor. You can then go back and change an assumption, a growth rate, or a cost, then press F10, the "graph" key, to automatically redraw the graph. When you're satisfied with the graph, you can add titles, legends, and colors. These presentation graphics are becoming an essential element in financial projects, because they make data more immediately understandable. The flexibility of *1-2-3*'s graphics function also makes it a valuable tool throughout the analysis process.

Accounts Receivable

Imagine that you're the sole proprietor of a small consulting practice and would like to computerize your accounts receivable. In many situations, dates, or counting days, are necessary. In accounts receivable management, you need to track when you wrote an invoice and when 30 days have passed so that a bill is overdue. *1-2-3* has a date function that can do these tasks.

In older spreadsheets, each column to be headed by a month had to be labeled separately. In *1-2-3*, the month labels for your accounts receivable system can be entered much more easily by typing:

Many accounting firm clients are now finding that they can create their own financial statements with personal computers.

```
@DATE(84, 1,1)
```

in the first cell. In the next cell to the right, enter 31 plus the name of the first cell, which will automatically generate the label for February. Then you can use the copy command to replicate that relationship in each cell to the right to get labels for all months through December.

Your accounts receivable system will also need a database of invoice records. Since *1-2-3* can maintain the invoices in a database structure, you will be able to sort them into customer order or invoice date order as needed, delete records when an account is paid, and extract overdue invoices to a separate database.

As you can see, you can use *1-2-3*'s functions to create a full general ledger system for a small business. The data table function could be used to create a database in which you enter all your checks and deposits with their dates and account numbers. You could then manipulate the data table to show the totals by account, by month, or by any criterion you need.

Real Estate Analysis

Real estate analysis has always been a popular use of electronic spreadsheets. One reason for this popularity is that real estate analysis methods are standardized across the country, so that one real estate analyst approaches problems from much the same viewpoint as another. The financial functions included in *1-2-3* can greatly enhance real estate analysis. The package includes a present value function and an internal rate of return function, as well as the more common net present value function.

If you were planning to build an office building, you'd know its cost, the amount of your down payment, the interest rate at which you would borrow the balance, and your expected rent income. You'd know your expected debt payments and your probable additional expenses. You could use this information in *1-2-3*'s internal rate of return calculation, which compares what you invest with your yearly income from it and computes your implied rate of interest. By calculating the internal rate of return for several possible investments, you can determine which one is the best use for your money.

Accounting

The small accounting firm has traditionally done tax work and built financial statements for its business clients. Many accounting firm clients are now finding that they can create their own financial statements with personal computers. Although the personal computer is reducing this segment of the firm's business, it's helping to expand its business in other fields such as business planning, forecasting, and financial statement analysis.

At least one accountant I know of used *1-2-3* to completely automate federal income tax return preparation and tax planning, cutting the time he needs to do these tasks from hours or days to minutes. This accountant is billing at his old rate and doing five times as much work as he did before he bought *1-2-3*. Many accountants use microcomputers and *1-2-3* to increase the efficiency of their work.

This same accountant has created a comprehensive financial analysis system

on *1-2-3*. He uses 30 or 40 pieces of information to build a several-month or several-year forecast for his clients' businesses and produces accompanying graphs. These graphs are invaluable to a client who needs to make a good impression on a bank corporate loan officer.

Accountants have found that *1-2-3*'s keyboard macros can replace their calculators. A keyboard macro programs the worksheet to perform a particular procedure automatically, which you then do not have to type in each time. For example, when you use the numeric keypad in the usual way, you total numbers by entering the first number, pressing the Num Lock key, moving the cursor down one cell, hitting the Num Lock key again, entering the second number, and so on. It's possible to create a simple three-line *1-2-3* keyboard macro that will accept the number you enter with the keypad, automatically move the cursor down one cell, and then wait for you to enter the next number. The macro program looks like this:

```
{?}       (Accepts input)
{DOWN}    (Moves cursor down 1
           cell)
/XG\A     (Goes to top of macro
           named \A)
```

The use of macros can go far beyond the function in this simple example. Suppose you need to computerize personnel information such as employee starting dates, lengths of tenure, and the dates and amounts of the last raise. You can use *1-2-3* to store this personnel data, then use keyboard macros to sort the database into different orders. After you create the macro, you just press one key to have the data sorted in the new order. *1-2-3*'s mathematical functions can help you compute pay rates, cost factors, and bonuses.

In this way, you can forge an amalgam of *1-2-3*'s separate functions into a specialized business tool. ■

Editor's Note: This article was based on information supplied by Douglas Ford Cobb, co-author of Using 1-2-3 *(Que Corporation, 1983).*

A 1-2-3 Wish List

Even the best software is never perfect. Here is a list of features we'd like to see added to 1-2-3.

Lotus' *1-2-3* has grabbed home users and financial analysts by the collar, lured them with the familiar look of its spreadsheet, and held their attention with its easily-created formulas, powerful functions, integrated graphics, and simplicity of data manipulation. We've found it immensely useful and a pleasure to work with. While we're not taking *1-2-3* for granted, nor growing weary of it, we've begun to dream about some of the things *1-2-3* might do. For as our skills in using *1-2-3* increase, so do our ideas about how it might fulfill its potential as the ultimate financial analysis software. So, count one, two, three, and take a trip with us into a PC user's fantasyland. If you believe, maybe Lotus will too.

Wish #1: *8087 mathematics coprocessor support*

We wish that *1-2-3* were faster. We appreciate the fact that *1-2-3* is able to manipulate our 400K RAM spreadsheets that need to be recalculated five times to get a correct answer, but we become impatient during the 5-minute wait. We'd like to see *1-2-3* use the 8087 plug-in chip that processes arithmetic five to ten times faster than the 8086.

Wish #2: *Beep at the end of a recalculation*

Since it takes anywhere from 3 to 10 minutes to recalculate a worksheet, it would be nice to have a beep signal its completion rather than having to look at the screen again and again.

Wish #3: *Custom color attributes for text*

We wish we could choose our background and foreground colors in *1-2-3*, just as we can on *WordStar*. Staring at *1-2-3*'s standard white-on-black gives many people eyestrain, as does looking at the green-on-black we can get by removing the information protection feature of the worksheet.

Wish #4: *Translate a standard print file into a* 1-2-3 *worksheet*

The ways in which *1-2-3* reads standard print files into a worksheet, such as files created by a mainframe computer or a statistical analysis program, just don't work very well. The important text command runs together all the characters of one line of a file and treats them as a label for one cell. Once this happens, we can no longer do arithmetic on the numbers from that line. The import number option removes the labels identifying the numbers as it reads the print file. It also removes text and blanks, so that numbers may no longer be in the correct columns. We've been getting around this problem by first loading the file into a *dBase II* database file, then reading the database into *1-2-3*. We wish *1-2-3* could accept and format standard print files directly.

Wish #5: *Transmit raw worksheet data to other computer systems*

Currently, we have to convert *1-2-3* spreadsheet data to ASCII format to transmit it to another computer, and when it reaches the receiving end, it cannot be reconverted for spreadsheet use. We'd like to be able to send spreadsheet data to another machine and reuse it without having to go through intermediate steps.

Wish #6: *Statistical analysis*

1-2-3 would be even more powerful if it included some extensive statistical functions, such as multiple regression analysis allowing for lagged variables.

(continued)

Then we wouldn't have to use a separate statistics program and go through that two-step procedure to load the data into *1-2-3*.

Wish #7: *Improve the keyboard macros*

We'd like *1-2-3*'s keyboard macros to be easier to use. The macros enable us to initiate a series of procedures with just one command and allow us to do such things as automatically link spreadsheets together. They save a great deal of time once they are set up, but they are time-consuming to write, test, and debug. For instance, it would be easier to type "rrr" rather than "right right right" in a macro to move the cursor. And we would rather not have to remember a long series of *1-2-3* prompts to be able to include all the correct responses to a macro. We get around this deficiency by using ProSoft's *ProKey Version 2.20* to create keyboard macros for *1-2-3*. *ProKey* allows you to define a macro interactively, so that you can write part of it, see the effect, and correct it instantly. It would be great if *1-2-3*'s macros worked the same way.

Wish #8: *Better protection*

Protection features prevent accidental alterations to spreadsheet information. The current default setting in *1-2-3* is to protect all cells; we have to remove the protection on the specfic data entry cells that we want to change. It would be a real improvement if a single command would protect all the formulas and cells and leave all the data entry cells unprotected.

Wish #9: *Automatic formula printout*

1-2-3 currently prints one formula per line when a formula printout is requested. It would be better if *1-2-3* printed them in a spreadsheet layout with the rows and columns automatically labeled and the column widths adjusted so that long formulas print out completely. We now set up this format manually by using *ProKey* to create a Lotus macro; we format the spreadsheet as text, increase the column width so that long formulas aren't truncated, put in a row and column labels, and print. We wish *1-2-3* would do this for us.

Wish #10: *Automatic subtotalling in data management reports*

When we print a report from a database, we usually want different subtotals for different categories. To do this we have to sort the data into the order in which we want it to appear in the report, then manually insert a line and the formulas for the subtotals where the category changes. We wish subtotalling of different categories in *1-2-3* reports were more automatic.

Wish #11: *Embedded control codes in cells*

Causing a new page to print in a report, like forcing subtotals, is a manual operation with *1-2-3*. We must insert enough blank lines to fill out a page, consuming both computer memory and our time. We would like to be able to force *1-2-3* to make page breaks by embedding control codes in spreadsheet cells. This technique would also give us a way to specify other options for printing cell contents, such as italics and underlining.

Wish #12: *A cell duplication function*

We wish *1-2-3* had a quick "ditto" function for duplicating the contents of spreadsheet cells without making us go through all the usual copy and edit commands.

Wish #13: *A global search function*

A useful enhancement to *1-2-3* would be automatic searching throughout a spreadsheet for a particular entry, which we now must do manually.

Wish #14: *Rudimentary word processing ability*

We'd like to build short memos around our spreadsheet results without having to leave *1-2-3*. We don't feel we'd need the equivalent of *WordStar* in order to do this, but we'd like to be able to do block moves, global word searches and replaces, and simple formatting of text.

Wish #15: *Graphics on a monochrome monitor*

It would be a great help if we could display *1-2-3*'s graphics on a monochrome monitor. Even though we wouldn't have the advantage of color, we'd be able to check the accuracy and arrangement of our graphs.

Wish #16: *Graphics printer and plotter support*

We would like to produce presentation quality graphics from *1-2-3* spreadsheets, but *1-2-3* doesn't support many of the commercially available printers and plotters. In a future version, we would like to see *1-2-3* include an installation routine in which we could specify the control codes required by any printer or plotter we want.

1-2-3 is an excellent basis for all the enhancements we've described; if Lotus made these changes, it would make *1-2-3* an even better tool for our financial analysis work. We hope that someone out there in Lotusland, Massachusetts, is listening and thinking up ways to turn our wishes into reality.—**Stephanie Stallings and Richard Werbin**

Handing Off Your 1-2-3 Files

Here are step-by-step instructions and protocols for transferring your 1-2-3 files to four software packages.

Although Lotus' *1-2-3* has many useful functions, at times you will want to use it in conjunction with other software, such as database managers and word processors. Transferring data between two vendors' packages can be daunting, especially the first time you do it. But the task is not as difficult as you might think, as long as all the vendors have built in some way to enter outside information into their packages.



I chose two database and two word processing packages as examples of how to send and receive data files to and from *1-2-3*. I have described the necessary steps for interfacing with each package. You must consider four different cases for each: (1) creating the correctly formatted *1-2-3* file for transfer to the other vendor's package; (2) reading in the altered *1-2-3* file to the other vendor's package; (3) creating the correctly formatted file from the vendor's package for transfer to *1-2-3*; (4) reading in the vendor's file to *1-2-3*.

If you study the instructions for each of the vendors' packages that I have chosen to cover, you can get a good idea of how to transfer information between other packages, too.

1-2-3 can create several different file types. You can distinguish most of them from one another by examining their filename extensions. The three major file types that *1-2-3* uses are the worksheet file (with a .WKS extension), the printout file (with a .PRN extension), and a graphics file (with a .PIC extension). Confusion may arise when you use the XTRACT command to save a worksheet's formulas or values to a disk file. The extension in both these cases is still .WKS, the standard worksheet extension. These files created with the XTRACT command are different than those created with the normal SAVE command, so you must be careful.

You might use two more types of extensions when you are using *1-2-3*'s Transfer facility. With Transfer, you can convert: .WKS files to .DIF files (*1-2-3* format to DIF format); .WKS files to .DBF files (*1-2-3* format to *dBASE II* format); .DIF files to .WKS files (DIF format to *1-2-3* format); .DBF files to .WKS files (*dBASE II* format to *1-2-3* format); .VC files to .WKS files (*Visi-*

Calc format to *1-2-3* format). If you select option 1, you will be able to create a Data Interchange Format (.DIF) file, which several other vendors use as well. Option 2 converts files to the .DBF format, with which all *dBASE II* users should be familiar.

Five different file extensions need to be kept straight: .WKS, .PRN, .PIC, .DIF, and .DBF .WKS files can be three possible types: the entire worksheet (formulas and values—created by the SAVE command), just the values (created by the XTRACT command), or just the formulas (also created by the XTRACT command). I will let you off easy. We can forget about keeping straight the .PIC graphic files and the .WKS formulas file since I will not be using them for this article.

1-2-3 and dBASE II

Here's how to transfer *1-2-3* files into Ashton-Tate's *dBASE II*, a sophisticated database manager.

Creating a .DBF file from 1-2-3

The first important step is to strip off all unused, unnecessary rows and columns from your *1-2-3* file. Also delete any blank columns, worksheet titles, and footnotes. These are not needed in *dBASE II* and only confuse the program. It is also helpful to give the first column a column title. This title will later be used for a field name.

After modifying the worksheet as I have described, save the file using the SAVE command and follow these instructions:

1. From the first entry menu, enter the Translate facility.
2. Select the .WKS to .DBF option.
3. Enter the source drive letter.
4. Enter the source file name (the one you just saved).
5. Enter the destination drive letter.
6. Select the Worksheet option (which translates the entire worksheet).
7. Select YES (starts the translation).

A *dBASE II* compatible file should now be created with the .DBF extension.

Reading the .DBF file into dBASE II

Follow the *dBASE II* instructions to view, change, or print the .DBF file since it is now a standard *dBASE II* file. For instance, enter the commands .USE <filename> and .BROWSE to view the records sent from *1-2-3*.

Creating a .DBF file from dBASE II

Again, follow the procedures for creating and then saving a database. The database file will normally have a .DBF extension attached.

Reading the .DBF file into 1-2-3

Follow these instructions:

1. Enter the Translate facility from the first entry menu.
2. Select the .DBF to .WKS option.
3. Enter the source drive letter.
4. Enter the source file name.
5. Enter the destination drive letter.
6. Select YES (starts the translation process).
7. Now enter *1-2-3* and get the file with the RETRIEVE command.

Transferring data between two vendors' packages can be daunting, especially the first time you do it. But the task is not as difficult as you might think.

1-2-3 and VisiWord

Here's how to transfer files between *1-2-3* and VisiCorp's *VisiWord*, a word processing program.

Creating .PRN file from 1-2-3

To view or modify a *1-2-3* worksheet using *VisiWord*, you first have to create an ASCII print file with a .PRN extension. Follow these instructions to create this .PRN file:

1. After the worksheet has been created, select the Print option.
2. Select the File option (prints to a disk file instead of the printer).
3. Enter the file name (.PRN will be added automatically).
4. Select the Range option.
5. Using the range select methods, choose the section of the worksheet you want to copy. The selected area should be in reverse video or highlighted.
6. Select the Go option (starts printing to disk).

Now a .PRN file has been created.

Reading the .PRN file into VisiWord

Follow the few instructions below:

1. Select the Revise option (when you first start *VisiWord*).
2. Select the List option (you should get a list of the files on the disk including the .PRN file, provided you copied it from the *1-2-3* disk to the *VisiWord* disk).
3. Move the cursor to the .PRN file and hit the Return Key.
4. The file should appear on screen (you might have to change the right margin if you originally had wide worksheet columns or too many of them).

Creating a .PRN file from VisiWord

Here's how:

1. Press the Esc Key to get to the commands menu.
2. Select the Print option.
3. Select the Model option.
4. Select "Print as IBM DOS File" from the list of printers and options. This option creates an ASCII file.
5. Select the Quit option.
6. Select the Disk option (writes the DOS file to disk).
7. Select the Type-in option.
8. Enter the filename with the .PRN extension.
9. Select the Quit option.

You will be back at the main editing screen and the .PRN file will have been created.

Reading the .PRN file into 1-2-3

There's nothing to this one. Just follow

these five simple steps:

1. Enter 1-2-3.
2. Select the File option.
3. Select the Import option.
4. Select the Text option.
5. Select the filename with the .PRN extension from the list.

The *VisiWord* file should appear on the screen. I did notice that an extra blank line was inserted beside every original blank line. These blank lines can be deleted fairly easily, but they are annoying.

1-2-3 and WordStar

WordStar, like *VisiWord*, requires the use of the .PRN file to interface with *1-2-3*. The procedures for creating (using the print command) and reading in (using the import command) these .PRN files are the same for *WordStar* as they were for *VisiWord*. So, to save space, I will only describe the steps for reading the .PRN files into *WordStar* and writing them out from *WordStar*.

Reading the .PRN file into WordStar

Follow these steps:

1. From the beginning menu, select D (to open a Document file).
2. Enter the filename with the .PRN extension.

The file should now be present on the screen.

Creating the WordStar .PRN file

This is even easier to do than reading in the .PRN file. It just takes one step. With the file on the *WordStar* editing screen, enter Ctrl-KX. This command will save the file and exit *WordStar*. Just make sure that you named the file with a .PRN extension.

1-2-3 and Data Base Manager II

To work with Alpha's *Data Base Manager II* (*DBM2*), which is itself made to interface with many different packages, you must create a worksheet in the format that I described in the *dBASE II* section. That is, it must have no empty rows and columns, worksheet titles, or footnotes. Once you have adjusted the format, use the following steps to create a .WKS file that you will use to transfer to *DBM2*:

1. Select the File option.
2. Select the Xtract option.
3. Select the Values option (you cannot transfer formulas).
4. Enter the filename (the .WKS will be added automatically).
5. Select the range or section of the worksheet you want to transfer.

The selection section of the worksheet should now have been saved correctly.

Reading the .WKS file into DBM2

Let's do it again:

1. From the opening menu of *DBM2*, press the F3 function key (which selects the *VisiCalc/1-2-3/WordStar* Link option).
2. Select option 4 (selects the *1-2-3* worksheet to *DBM2* transfer).
3. Select the source drive letter.
4. Enter the filename (do not add a .WKS extension).
5. Select Y (yes, the file has field names).
6. Enter the new *DBM2* database name.
7. Press the Enter key several times to select default field names and column widths.
8. The last time you press the Enter key should take you back to the main menu after the file has been processed by *DBM2*. You can now use the view records command or anything else in *DBM2* to work with the new data transferred from 1-2-3.

Do not be afraid to experiment. Just make sure that you have backed up your original files and then play around with some of the options until something works.

Creating a .WKS file from DBM2

Just follow the bouncing ball:

1. From the opening menu, select the database that you want to send.
2. Select option 14 (*VisiWord/1-2-3/WordStar* Link).
3. Select option 5 (*DBM2* to *1-2-3* worksheet).
4. Select the destination drive letter.
5. Select Y (starts the transfer).
6. Enter 1 (starts with the first record).
7. Enter the last record number so that all the records are sent, or enter the number of records that you want to send.
8. Select the fields that you want to send or press the F1 key to select them all. The *1-2-3*-compatible worksheet (.WKS) file is now created and ready to be sent.

Reading the .WKS file into 1-2-3

Just follow the normal procedure for retrieving worksheet files:

1. Select the File option.
2. Select the Retrieve option.
3. Select the filename from the list or type the filename in.

Some Rules Of Thumb

In general, you will want the *1-2-3* worksheet information to go to either a word processor for reports or to and from a database program for filing and sorting. With word processors, you can usually be sure that you can send the information in a .PRN extension file and have the word processor work on that file like it would any other ASCII file.

Database manager protocols are a bit more confusing, but not impossible to figure out. In most cases, the database management package you are using will be able to accept either the .DIF format or the .DBF format, so just use the steps I have outlined above. Do not be afraid to experiment. Just make sure that you have backed up your original files and then play around with some of the options until something works. Good luck! ■

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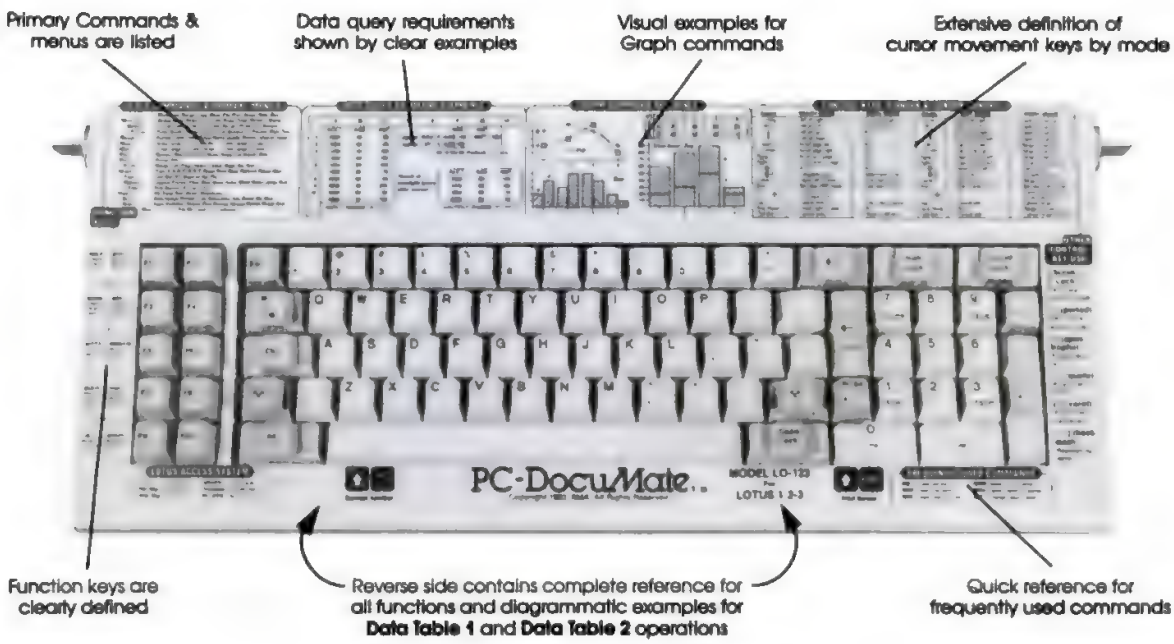
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CIRCLE 441 ON READER SERVICE CARD

Armed For Learning 1-2-3

A ready supply of books, disks, cassettes, videocassettes, and keyboard templates are available to teach you 1-2-3.

In politics, it's called hopping on the bandwagon. A year-and-a-half ago, Lotus' *1-2-3* didn't exist. By mid-winter of this year, 20,000 to 23,000 copies of the integrated software package were moving into users' hands every month.

In an effort to help new users, and themselves, about two dozen companies have climbed aboard the Lotus bandwagon and come up with all manner of tutorial books, cassettes, disks, keyboard templates, and videocassettes. Prices range from less than $10 for a book to $499—$4 more than *1-2-3* costs all by itself—for a set of three videocassette tutorials.



PC recently examined the current offerings in order to evaluate how well they teach *1-2-3*, whether they are better than Lotus' own tutorial, and whether they're necessary for PC users who've been exposed to less sophisticated spreadsheets such as the original *VisiCalc*.

Which method of learning *1-2-3* is best? There's something good to be said about each of them. Books are cheap and you can examine them in the store before buying. The easiest books to use have the plastic-spine bindings that open readily and lie flat on the desk as you work.

Listening to a cassette is like having a tutor sitting behind you. The big drawback is that your unseen tutor can't reach over your shoulder and say, "Oops, wrong key." If you listen on a Walkman-type cassette player with headphones, it helps drown out distracting noise.

Disk tutorials catch your mistakes and they're better for reviewing than cassettes. But none of the aftermarket tutorials actually run *1-2-3;* they run a mock-up.

A keyboard template puts all the commands right in front of you, next to your keyboard. It eliminates the need to leaf through the pages of the *Lotus 1-2-3 Quick Reference* manual.

Videocassettes show the program up and running. They make use of your sight and hearing, and in a corporate environment with an audiovisual training center already set up, they are a sensible choice. Videocassettes can't recognize and correct your mistakes, although they do show on screen what your results are supposed to be. The big failing of videocassettes is

their poor picture quality.

That's the broad picture. Now let's look at each of these tutorial categories more closely and attempt to identify some of the better products you will find within each group.

Books and Disks

One *1-2-3* guidebook stands apart from the pack: *Using 1-2-3* by Geoffrey T. LeBlond and Douglas Ford Cobb. *Using 1-2-3* is an all-encompassing tutorial offering background on computers, lectures on spreadsheet functions, and a history of the advances in spreadsheet capabilities. The back of the book is a five-page chart comparing *1-2-3*'s features with *VisiCalc*'s.

Here's one reason why *Using 1-2-3* is worth having: As an introduction to the *1-2-3* statistical functions, it quickly reviews mean, median, mode, variance, standard deviation, population, and sample statistics—it gives just enough information to help you recall what you learned in college. *Using 1-2-3* also has the best guide to installing the program on your PC. (Other tutorials we looked at gave inadequate explanations of how to install *1-2-3* on the PC. With most of them, you're pretty much on your own in getting DOS on the needed disks, making backups, transferring files to a hard disk, configuring a printer, and so on.)

Its drawbacks? The artwork consists of poorly reproduced screen photographs, and some of the charts purporting to show how the cell pointer moves around the worksheet are not clear. Also, the wide inner margins should have been used to cross-reference appropriate pages in the factory manual.

Two books that help teach *1-2-3* by example are *The Power of: 1-2-3* and *The Power of: Financial Calculations for Lotus 1-2-3*, both published by the Management Information Source with Spectrum Books. These books are aimed at the *1-2-3* user who has already learned the basics of spreadsheet entry and wants to get cracking on real-world applications, but who, perhaps, doesn't feel comfortable going it alone. The books present step-by-step instruction in building working electronic templates, which can be used as is, modified to suit individual tastes, or ignored completely except for the learning value.

The Power of: 1-2-3 covers stock portfolio maintenance, accounts receivable aging reports, production scheduling, invoicing from inventory, amortization schedules, accounts payable, estimating, cost recovery, daily inventory, and the ever-popular checkbook ledger. *The Power of: Financial Calculations for Lotus' 1-2-3* covers 22 topics in five general areas: annuities, securities, statistical analysis, bonds, and amortization schedules.

If you find you're catching on quickly, just press the spacebar and the tutorial does the keyboard entries for you.

Both books are available with disks containing prepared worksheets with labels and formulas already entered.

Two books *PC* saw in final galley form were *1-2-3 Go!* by Julie E. Bingham and a pair of workbooks derived from the Computer Tutor Corporation's Boston-area classroom tutorial programs. *1-2-3 Go!* is an adequate tutorial, but it doesn't compare with *Using 1-2-3*.

The *Self-Teaching Guides for the 1-2-3 Training Course* by the Computer Tutor Corporation contain one concept per page and nearly every page has a printout of the screen display to keep the student on track. Everything is well explained. The workbooks aren't cheap, though: they cost $39.95 each.

Since Lotus already includes a disk tutorial with *1-2-3*, why buy another disk tutorial?

The *Lotus 1-2-3 Tutorial Disk* is at least the equal of any of the aftermarket disk tutorials reviewed by *PC*. And it's free, once you plunk down your $495 for the program. The tutorial comprises six lessons that run for about 30 minutes each. As with the aftermarket tutorials, the screen is split top and bottom. The top is the *1-2-3* program; the bottom is for instruction and user entries.

On the top display, the actual *1-2-3* program is altered so that none of the practice worksheets are saved to disk. As different values are entered, you see the results ripple through the worksheet.

When you tap the PgUp or PgDn key, the program backs up or advances as many as 15 screens. If you find you're catching on quickly, just press the spacebar and the tutorial does the keyboard entries for you.

A positive feature of the *Lotus 1-2-3 Tutorial Disk* is the quality of its presentation. The tutorial clearly was written or overseen by someone who cares about the English language and has a low-key sense of humor.

The tutorial's six lessons cover starting up, the basic entry and moving-about commands, using the worksheet (three lessons), the database (in brief), and graphing. The graphing lesson will run on a PC with a monochrome monitor, but you can't see the finished graphs.

The *Lotus 1-2-3 Tutorial Disk* has a few drawbacks. Pressing the Esc key summarily ejects you from the tutorial and sends you back to the menu. You can't return to where you were except by starting at the beginning and working your way through again. The tutorial should have an "Are you sure?" prompt when that key is pressed, as does the real *1-2-3* when you try to exit the worksheet. Another drawback is that the financial-analysis worksheet examples may be a bit complex for novices.

Among the other companies marketing disk tutorials are American Training International, Advanced Systems, Inc., and Cdex (which has three separate tutorials

out). Most cost in the $70 to $80 range.

American Training International may be the biggest and best-known of the PC disk-tutorial companies, but it has, in the past, rushed some real dogs to market (on *WordStar* and *dBASE II*) that included typos and bad commands and gave only superficial instruction. Happily, *ATI Training Power: Teach Yourself Lotus 1-2-3* shows somewhat more care in development.

Advanced Systems, Inc.'s *MicroTutor for Lotus 1-2-3* is the ATI program massaged a bit and sold in a classier easel binder to appeal to the Fortune 1000 crowd. The ASI program runs in color, but on a PC with a monochrome monitor, the copy *PC* reviewed failed to display inverse video for the borders and current cell location.

PC's version of ATI ran in black & white only, but the company says current versions are in color. The instruction in both the ASI and ATI tutorials overlaps more than it expands on Lotus' own tutorial. ATI's tutorial covers signing on, setting up the program, entering data, sorting data files, saving data, adding to the worksheet, the scoreboard, using windows, graphing, writing memos, and printing. Although the two are largely the same, ATI recommends running the Lotus factory tutorial first, then the ATI tutorial, while ASI recommends using its tutorial first, then the Lotus tutorial.

The two tutorials have a few bugs. One title reads "Setting Up a Database," yet instruction underneath refers to setting up a spreadsheet, (which Lotus refers to as a worksheet). Another bit of instruction tells the user, "This highlighted mark is called the worksheet cursor," which Lotus calls a "cell pointer." And when you use a monochrome monitor with the ASI tutorial, nothing is highlighted.

One tutorial that wasn't ready for review by *PC*'s deadline but that might be worth a look is *Advanced Lotus 1-2-3* from Cdex Corp. Cdex says this tutorial picks up where the factory tutorial ends. Past Cdex tutorials have been well done.

Protect your Training Aids

Many manufacturers of 1-2-3 training aids have neglected to write-protect or record-protect their tutorials. Here's how to prevent accidental damage to your copy.

Many manufacturers of *1-2-3* tutorials have put their products into the hands of PC novices without bothering to put write-protect tabs over disk tutorials or to knock out the protective tabs on the backs of audio and videocassettes. Shame on them!

To protect your investments, be sure to either make a backup disk or write-protect the master by covering the notch cut along one side of the disk with the supplied tabs. You can freely make back-up copies of all of the examples disks and some of the tutorial disks; others are copy-protected.

To protect an audio or videocassette tape from accidental re-recording, take a pen and knock out the little plastic tab (two on audio cassettes) on the back edge.

About half the tutorial and worksheet-example disks, audio cassettes, and videocassettes came in for review unprotected. While listening to an unprotected audio tape, you can stab for the pause or stop button and, by mistake, brush the record button, putting little cracks and pops on the tape. Without write-protection on a worksheet-examples disk, if you make changes to a worksheet and save them using the same filename, the next user is stuck. —W.K.H.

Some of the disk tutorials cross over from training tools to working tools. If you have a specific business use in mind and a fair grasp of *1-2-3* from the factory tutorial, one of these could be helpful.

Managing Your Business Using the Lotus 1-2-3 Program from Cdex focuses on the return on equity (ROE) method of analyzing business performance. One disk, complete with quizzes and exercises, teaches the concepts and one disk provides ten Lotus worksheets complete with all the necessary formulas. The ten Cdex worksheets, or electronic templates, include sales history/forecasting, a product margin analysis/forecast, a department expense budget, a profit/loss statement, a cash flow projection, a materials requirement plan, an accounts receivable record/analysis, accounts payable, a balance sheet, and a profit model.

Also just out from Cdex is a companion tutorial, *Making Business Decisions Using the Lotus 1-2-3 Program. Making Business Decisions,* says a Cdex spokesman, shows how *1-2-3* can be used to analyze six common business decisions such as make versus buy or whether to order in quantity. It comes with ready-to-go *1-2-3* electronic templates (already prepared Lotus worksheets).

Financial Planning with Lotus 1-2-3 from Howard W. Sams & Company consists of 16 electronic templates, covering compound interest, annuities, discounted cash flows, profit planning (break-even analysis, depreciation, accumulated cost recovery system), statistics (mean/standard deviation, variance, linear regression), and creative real-estate finance (variable rate and balloon mortgages). Unlike the Cdex tutorials, this one has no on-disk instruction or theory, which is in an accompanying IBM-size reference binder. These "mind tools," as Sams & Company calls them, are programmed to

take over operation of the Lotus program, presenting the user with a series of prompts and menu options similar to, but not the same as, *1-2-3*'s. Novices may find it hard to figure out what's *1-2-3* and what's the disk overlay.

DB Tutor from Comprehensive Software is a quickie overview and tutorial for the database functions of three programs—*1-2-3*, *dBASE II*, and *T.I.M.*—that also includes its own usable database, *PC Base*. The instruction is extremely brief, 20 to 30 minutes for each program, and *1-2-3*'s worksheet functions are only discussed where they duplicate its database functions. Instructions for inserting the disks and starting up, however, are superb.

Audio Cassettes

When you use audio cassettes, you can put on a lightweight pair of headphones and nothing but the most cataclysmic of noises will interrupt your training session. Before you begin a training session, make sure you have instructions on how to quickly back up and erase mistakes (see sidebar, "Make Corrections Fast") tacked up near your PC. If you can catch your own typing mistakes, cassettes are at least as good a choice as disk tutorials.

How to Use Lotus 1-2-3 from FlipTrack Learning Systems consists of four cassettes, a 63-page pamphlet, and an attractive tan binder. Each tape runs 52 to 55 minutes per side. Optional material on the flip side covers some of the more esoteric of the *1-2-3* commands, such as scientific notation, graphing multiple ranges or frequency distributions, and trouble-shooting sessions for novices. To use the FlipTrack system, you set the tape counter to 0, turn the tape over, listen to the optional material, rewind the tape until the counter hits 0, and flip the tape back to side 1. The FlipTrack concept works well, but as one competitor points out, if you plan to take each FlipTrack detour, the process quickly becomes cumbersome.

Of the four FlipTrack tapes, two and one-half tapes are devoted to the *1-2-3* spreadsheet, one-half a tape to the database, and one tape to Lotus graphics. Unlike some other tapes, FlipTrack adequately introduces new concepts, and beeps mark points when all but the speediest learners will want to stop the tape and enter information.

The pace gets harder to follow during the second or third tape as the *1-2-3* commands get more complex, a problem common to most of the cassette tutorials. The problem is that if the tutorial were a book or disk, you'd see exactly what needs to be typed in. With the tape, however, you may have to back up to listen a second time to make sure. The narrator's enunciation is better on the FlipTrack tape than on others. Unfortunately, the FlipTrack tape isn't specific to the IBM PC's keypad and function key assignments. It might tell you to use the "Goto" key without specifying the F5 key on the PC, which could be frustrating for novices.

TechniLogic's *Criterion Personal LearningWare for 1-2-3* is a value-packed, readily affordable taped tutorial. You get two 1-hour, PC-specific tapes with an upbeat background music track, an eight-page examples folder, and a three-color keyboard template with cross-references to the manual. You also get a moment of offbeat humor on tape 2 when the announcer tells you to clear the "window" that splits the screen in half. A high-pitched voice interjects, "I don't do windows."

Of all the *1-2-3* tutorial cassettes and programs, *Criterion Personal LearningWare* may be the most friendly and easy to use for the novice. Part of its advantage is

Make Corrections Fast

When you're following along with a cassette or videocassette tutorial and you hit the wrong keys, here's how to get back on track in a hurry.

A command is anything that starts with a slash. Press the Esc key to back up one step, or hold the Esc key down to go all the way back to base state (you'll see "Ready" in the upper right-hand corner). Type in the correct command.

Wrong entry in worksheet cell

If you're typing an entry and haven't pushed the Enter key yet, hit Esc and the entry will be wiped clean. Type the correct entry. Or hit the Backspace key on the top row, above the Enter key. Each stroke wipes out one letter. Back up until all your mistakes are gone, then retype. Hit Enter to lock in your entry.

If you've already entered the data by pushing the Enter key and you're still at the bad cell:

Type F2, the edit function key. Then use the Backspace key to back up and delete letters right to left. Hit Home to go to the beginning of the entry, then End to go to the last character. Press Del to delete the character where the cursor is. Use the cursor keys to move left or right without deleting, and press Enter to lock in your correct entry.

If you see a mistake in another cell: use the cursor keys to move to the bad cell. Retype the entry and press Enter. Or use the cursor keys, and then hit F2 to recall the bad entry for editing.

If the cell is supposed to be blank: use the cursor keys to go to the bad cell. Quickly type /RE-Enter—typing F2 Esc won't work, nor will backspacing away all the characters.

You may want to clip this sidebar and keep it near the terminal when learning and using *1-2-3*. —W.K.H.

A Tutorial Sampling

The number of manufacturers and publishers offering instructional aids for 1-2-3 keeps growing. Here's a partial listing of those with current offerings in the market. The tutorials reviewed in the article are included.

Books

Using 1-2-3
Geoffrey T. LeBlond and Douglas Ford Cobb
(Que Corp., 7999 Knew Rd. #202, Indianapolis, IN 46250, [800] 428-5331, [317] 842-7162, 1983)
421 pp.; softcover, $14.95

CIRCLE 721 ON READER SERVICE CARD

Self-Paced Training for 1-2-3
(Computer Tutor Corp., 23 Central St., Wellesley, MA 02181, [617] 237-1840, 1983)
125 pp.; vinyl binder $44.95 with examples disk
Requires: 192K RAM, one disk drive, *1-2-3* to use examples disk.

CIRCLE 720 ON READER SERVICE CARD

The Power of: Lotus 1-2-3
(Management Information Source [and Spectrum Books], 3543 N.E. Broadway, Portland, OR 97232, [503] 287-1462, 1983)
178 pp.; softcover, $14.95, $28.95 with examples disk
Requires: 192K RAM, one disk drive, *1-2-3* to use examples disk.

CIRCLE 719 ON READER SERVICE CARD

All About 1-2-3
Robert Schware and Alice Trembour (dilithium Press, 8285 S.W. Nimbus #151, Beaverton, OR 97005, [800] 547-1842, [503] 646-2713, 1983)
128 pp.; softcover; $9.95

CIRCLE 717 ON READER SERVICE CARD

The Power of: Financial Calculations with Lotus 1-2-3
(Management Information Source [and Spectrum Books], 3543 N.E. Broadway, Portland, OR 97232, [503] 287-1462, 1983)
166 pp.; softcover; $14.95, $28.95 with examples disk
Requires: 192K RAM, one disk drive, *1-2-3* to use examples disk.

CIRCLE 718 ON READER SERVICE CARD

Cassettes

1-2-3 Personal Tutor
(three tapes, examples disk)
1-2-3 Personal Tutor, Vol. 2
(three tapes, examples disk)
Personal Tutor Associates
Box 246
Clinton, MD 20735
(301) 856-2280
List Price: $49.95 each, $2.50 shipping
Requires: Cassette recorder; 192K RAM, one disk drive, *1-2-3* to use examples diskette.

CIRCLE 707 ON READER SERVICE CARD

Criterion Personal Learningware for Lotus 1-2-3
(two one-hour tapes, keyboard template, examples booklet)
TechniLogic
2634 Chapel Hill Boulevard, #109
Durham, NC 27707
(919) 493-4560
List Price: $29.95, $1.50 shipping
Requires: Cassette recorder.

CIRCLE 706 ON READER SERVICE CARD

How to Use Lotus 1-2-3
FlipTrack Learning Systems
999 Main St., Suite 200
Glen Ellyn, IL 60137
(312) 790-1117
List Price: $75, $2.50 shipping
Requires: Cassette recorder, preferably with counter.

CIRCLE 709 ON READER SERVICE CARD

Lotus 1-2-3 Audio User's Manual
Micro Instructional, Inc.
3453 N. W. 55th St.
Fort Lauderdale, FL 33309
(305) 485-6880
List Price: $49.95, $4.50 shipping
Requires: Cassette recorder.

CIRCLE 708 ON READER SERVICE CARD

Disk Tutorials

Microtutor for Lotus 1-2-3
(one disk)
Advanced Systems Incorporated
2340 S. Arlington Heights Road
Arlington Heights, IL 60005
(800) 238-2625, (312) 981-4260
List Price: $80, $1.50 shipping
Requires: PC-DOS, 64K RAM, one disk drive.

CIRCLE 704 ON READER SERVICE CARD

DB Tutor (three disks and manual)
Comprehensive Software Support
2316 Artesia Blvd. Suite B
Redondo Beach, CA 90278
(213) 318-2561
List Price: $69.95
Requires: 64K RAM, one disk drive.

CIRCLE 699 ON READER SERVICE CARD

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(A Tutorial Sampling continued)

ATI Training Power: Teach Yourself Lotus 1-2-3 (one disk and manual)
American Training International, Inc.
3770 Highland Ave., Suite 201
Manhattan Beach, CA 90266
(213) 546-4725
List Price: $75, $2.50 shipping
Requires: 64K RAM, one disk drive.

CIRCLE 703 ON READER SERVICE CARD

Managing Your Business Using the Lotus 1-2-3 program (one disk, one template disk, guide)
Advanced Lotus 1-2-3 (one disk and guide)
Making Business Decisions Using the Lotus 1-2-3 program (one disk and guide)
Cdex Corp.
5050 El Camino Real
Los Altos, CA 94022
(800) 982-1213, (415) 964-7600
List Price: $69.95 each
Requires: 64K RAM, one disk drive; 192K RAM, two disk drives, *1-2-3* to use template disk.

CIRCLE 702 ON READER SERVICE CARD

Financial Planning With Lotus 1-2-3 (one disk of electronic templates)
Howard W. Sams & Co.
Box 7092, 4300 West 62nd St.
Indianapolis, IN 46206
(317) 298-5400, (800) 428-SAMS (orders)
List Price: $79.95
Requires: 192K RAM, one disk drive, *1-2-3*.

CIRCLE 701 ON READER SERVICE CARD

Lotus 1-2-3 Tutorial Disk
Lotus Development Corp.
161 First St.
Cambridge, MA 02142
(617) 492-7171, (617) 494-1192
List Price: Included with *1-2-3* ($495)
Requires: 192K RAM, one disk drive, *1-2-3;* color/graphics card optional to view completed graphs.

CIRCLE 700 ON READER SERVICE CARD

Keyboard Templates

Kleertex Template for Lotus 1-2-3 (with index card)
Creative Computer Products
Box 85152 - MB 134
San Diego, CA 92138
(800) 231-5413, (800) 523-5441, (619) 268-0793
List Price: $32.95, $1.95 shipping
Requires: IBM PC or compatible keyboard.

CIRCLE 696 ON READER SERVICE CARD

PC-DocuMate for Lotus 1-2-3
Systems Management Associates
Box 20025, 3700 Computer Drive
Raleigh, NC 27619
(919) 787-7703, (800) 762-7874
List Price: $14.95
Requires: IBM PC or Compaq.

CIRCLE 695 ON READER SERVICE CARD

Videocassettes

Learning Concept: Lotus 1-2-3 (forthcoming)
Micro Learning Concepts
380 Lexington Ave #1208
New York, NY 10017
(212) 687-0066
List Price: $99.95 in Beta and VHS formats, ¾-inch format $129.95
Requires: Videocassette recorder.

CIRCLE 692 ON READER SERVICE CARD

1-2-3: An Introduction to the Integrated Spreadsheet (with guides)
1-2-3: Advanced Features (with guides)
ANDERSON SOFT-TEACH
2161 Blossom Valley Drive
San Jose, CA 95124
(800) 227-3800 x 400, (408) 356-3552
List Price: $195 each, $3 shipping, VHS, Beta, & ¾-inch formats available
Requires: Videocassette recorder.

CIRCLE 694 ON READER SERVICE CARD

StartUp: Lotus 1-2-3 (three video cassettes, program synopsis, manual, disk for data files)
Computer Labs of America
9340A Clairemont Mesa Blvd.
San Diego, CA 91223
(619) 576-1133
List Price: $199 each, all three for $499, available in VHS, Beta or ¾ inch formats
Requires: Videocassette recorder.

CIRCLE 693 ON READER SERVICE CARD

Guide to Lotus 1-2-3 (with workbook)
Video Initiative
345 Swett Rd.
Woodside, CA 94062
(415) 851-8437
List Price: $110 for VHS or Beta format, $135 for ¾-inch format
Requires: Videocassette recorder.

CIRCLE 691 ON READER SERVICE CARD

1-2-3 Go!
Julie E. Bingham
(Addison-Wesley Publishing Co., Reading, MA 01867, [617] 944-3700, 1984)
271 pp.; softcover; price $14.95

CIRCLE 716 ON READER SERVICE CARD

The Osborne/McGraw-Hill Guide to Using Lotus 1-2-3
Edward Baras
(Osborne/McGraw-Hill, 2600 10th St., Berkeley, CA 94710, [800] 227-0900, [415] 548-2805, forthcoming)
est. 250 pp.; softcover; $16.95

CIRCLE 715 ON READER SERVICE CARD

1-2-3 for Business
Hugh McLaughlin and Leith Anderson
(Que Corp., 7999 Knew Rd. #202, Indianapolis, IN 46250, [800] 428-5331, [317] 842-7162, 1984)
421 pp.; softcover; $14.95

CIRCLE 714 ON READER SERVICE CARD

1-2-3 Revealed
Dan Shaffer
(Reston Publishing Co., 11480 Sunset Hills Rd., Reston, VA 22090, [800] 336-0338, [703] 437-8900, 1984)
288 pp.; softcover; $16.95; hardcover, $21.95; $39.95 with examples diskette

CIRCLE 713 ON READER SERVICE CARD

1-2-3 at Work
Tom and Nancy Cain
(Reston Publishing Co., 11480 Sunset Hills Rd., Reston, VA 22090, [800] 336-0338, [703] 437-8900, 1984)
368 pp., softcover; $16.95, hardcover; $21.95

CIRCLE 712 ON READER SERVICE CARD

The ABCs of 1-2-3 (forthcoming)
Chris Gilbert
(Sybex, Inc., 2344 Sixth St., Berkeley, CA 94710, [800] 227-2346, [415] 848-8233)
225 pp.; softcover; $12.95

CIRCLE 711 ON READER SERVICE CARD

Training Pack for Lotus 1-2-3
(two cassettes, example disk, reference cards)
InfoSound, Inc.
1160 Eisenhower Pl.
Ann Arbor, MI 48104
(313) 973-7400
List Price: $69.95
Requires: Cassette recorder; 192K RAM, one disk drive, *1-2-3* to use examples disk.

CIRCLE 705 ON READER SERVICE CARD

Teach Yourself Lotus 1-2-3 on the IBM PC (with manual)
Deltak Microsystems
East/West Technological Center, 1751 West Diehl Rd.
Naperville, IL 60566
(800) 532-7686, (312) 369-3000
List Price: $70
Requires: 64K RAM, one disk drive.

CIRCLE 698 ON READER SERVICE CARD

Micro Map Learning System (disk, reference guide, forthcoming)
Micro Map Systems, Inc.
835 E. Glenside Ave.
Wyncote, PA 19095
(215) 572-5187
List Price: TBA
Requires: TBA.

CIRCLE 697 ON READER SERVICE CARD

Doing Business With 1-2-3
(forthcoming)
Stan Trost
(Sybex, Inc., 2344 Sixth St., Berkeley, CA 94710, [800] 227-2346, [415] 848-8233), 250 pp.; softcover; $17.95

CIRCLE 710 ON READER SERVICE CARD

—W.K.H.

its full-keyboard template, which both lists and explains the most common *1-2-3* functions. Both the template and tapes refer to specific pages in the *Lotus 1-2-3 Reference* manual when detailed information is needed. The template is made of cardboard, although newer releases will be plastic, according to TechniLogic president E. William Strang.

Personal Tutor's explanation of the built-in functions is the best of any 1-2-3 tutorial.

Rather than ignore Lotus' disk tutorial, the *Personal LearningWare* tutorial weaves itself into the Lotus tutorial. The first 10 minutes of the tape lead into section A of the Lotus tutorial, followed by more tape instruction, followed by section B, and so on. TechniLogic appears to be way ahead of the competition.

1-2-3 Personal Tutor is a strange beast. It's easily the least polished of the cassette tutorials. Sound levels inexplicably rise and fall, the announcer sounds like he has a cold, and there's printer and keyboard noise in the background. Yet a certain homespun charm and underlying level of technical know-how save the tutorial from being a joke. *Personal Tutor*'s explanation of the built-in functions (things like loan payments and statistical analysis) on the second of its three 90-minute tapes is the best of any *1-2-3* tutorial. (Tape 1 covers basic commands, tape 3 covers graphics and databases.) It's also the only cassette that comes with a diskette that contains 18 worksheet examples.

Personal Tutor Associates also makes an *Advanced 1-2-3 Personal Tutor*, another 4.5 hours of tape covering advanced programming methods and business graphics.

Micro Instructional's *Lotus 1-2-3 Audio User's Manual* is a single 90-minute

cassette. You get one tape—no user's guide, no template, no examples disk. Just a 90-minute cassette. Sound quality is passable and topics don't run together as they do on some other Micro Instructional products. The announcer recommends noting the point on the tape counter where each topic starts for later review. Quality of instruction is adequate.

Keyboard Templates

Unlike the template supplied with *1-2-3*, which lists only the ten function key commands, the PC-DocuMate from Systems Management Associates and the Kleertex from Creative Computer Products surround the keyboard and cover all the common Lotus commands. Both are printed on two sides because of the large number of *1-2-3* commands (about 120). When either template comes out of the box, the initial impression is, "No way am I ever going to learn this program!" It's a bit mind-boggling to see all the *1-2-3* commands written out. The templates work best for the moderately skilled *1-2-3* user who wants to avoid leafing through the Lotus reference manual.

Here are the pros and cons of the two templates: PC DocuMate is cheaper, and locating material on it is easier. Kleertex covers substantially more commands, spilling over onto a 2½-inch-by-18-inch plastic auxiliary strip, and is packed in a sturdier shipping carton (two out of three PC-DocuMate templates I have received had been slightly bent).

For a beginner, the cardboard template that comes free with the TechniLogic *Criterion Personal LearningWare* cassettes is actually easier to use.

Videocassettes

If you paid $19.95 for a short, well-written *1-2-3* tutorial book in which all the illustrations were hopelessly blurry, you'd be a bit miffed. Videocassette tutorial companies want you to spend $200 for the high-tech equivalent: crisp, well-paced instruction, and guaranteed eyestrain every time the tutorial video tape focuses on the computer display.



The picture quality is so poor because a camera is photographing the PC screen, rather than recording a signal directly from the computer. With this method, 20 to 30 characters across the screen is about the upper limit of legibility, yet the videocassette tutorials routinely cram 40 or more characters across the screen. Sitting close to the TV screen helps legibility, but the blurriness doesn't go away.

> 1-2-3 is now popular enough that some colleges may offer it as a noncredit course.

Even so, if you already have a VCR and if someone else (say your company) is footing the bill, videocassettes might be your first choice. Videocassettes take computer training into a new dimension. Seeing someone else successfully running *1-2-3* is a big help.

The two videocassette tutorials *PC* reviewed take somewhat different approaches. The three 40-minute *Startup: 1-2-3* tutorials from Computer Labs of America are paced to allow the user to work along without stopping the tape. Every worksheet used in the tutorial is thoughtfully included on an accompanying examples disk.

The two 35-minute tapes from ANDERSON SOFT-TEACH take the form of a dialogue/training session between a businessman and instructor. They would be impossible for even an Olympic-caliber typist to follow without flicking the pause button frequently. The acting is a bit less



stiff on the SOFT-TEACH tapes.

Computer Labs' *Startup* tapes familiarize the user with the *1-2-3* screen, the keyboard layout, basic functions, and entering and editing information. Tape 2 looks at the *1-2-3* command menu. Tape 3 covers information management (the database) and graph functions. One-page summaries come with each lesson, and having the worksheet disk means you can practice *1-2-3* instead of doing a lot of typing. Computer Labs says you should be familiar with the electronic spreadsheet concept before viewing its *1-2-3* tapes. If you're not, the company can help, for $199, with an *Introduction to Electronic Worksheets* tape.

The SOFT-TEACH tape 1 covers much the same material as the *Startup* tapes 1 and 2, but in a brisk 38 minutes. To keep up while following along on your own PC, you'll need to make frequent use of the pause button. Between tapes 1 and 2, it's assumed the user has spent time practicing on *1-2-3*. The SOFT-TEACH tape 2 (31 minutes) explains how to program keys (keyboard macros) and consolidate worksheets, graphs, and databases. The database section is 5 minutes long; some of the audio cassette tutorials spend almost an hour on that topic alone. A SOFT-TEACH *VideoGuide* booklet highlights the concepts presented on the two tapes.

Hustling through these videocassettes isn't necessarily that bad an idea, since *1-2-3* does come with a passable disk tutorial. And for some, memorizing every one of the 100-plus *1-2-3* commands isn't important. For now, you may just want to feel comfortable at the keyboard.

Instruction

Many computer dealers offer classroom training for popular programs, including *1-2-3*. Major chains are especially active: ComputerLand, Entre, Sears, and the IBM Product Centers all offer training. (Since these dealers charge for training, you needn't have bought *1-2-3* there to sign up.) Major metropolitan areas often have permanent private training firms, although they may be geared to service companies rather than individuals.

SoftwareBanc of Boston offers traveling *dBASE II* and *1-2-3* seminars in major cities. Also, *1-2-3* is now popular enough that some colleges may offer it as a noncredit course. Expect to pay $100 to $200 for a day of instruction.

For dealers and private training firms, Lotus Development Corporation markets an *Introduction to 1-2-3* package that can be used as the framework of a dealer training program. A master package of notes, enlarged screen displays, and overhead transparencies is $495 with 10 student workbooks. Additional workbooks are $36 to $40 in quantity.

It's also possible to hire a consultant for one-on-one training. Expect to pay in the range of $25 per hour. To find a consultant, ask around at your computer store. If no one there knows of one the local computer club or computer science department at a college in the area may have leads.

For some PC users, simply having a voice on the phone to answer occasional questions may be all the instruction they need. You can ensure that you get this resource by buying locally instead of by mail order, or by buying from a mail-order company that includes technical support in the price.

Conclusions

The *1-2-3* fundamentals are similar to those of other spreadsheets, but with so many commands, even a star *VisiCalc* operator may want a little help from the aftermarket. Which tutorials?

Two products stand out because of their price and quality: *Using 1-2-3*, the book, $15; and *Criterion Personal LearningWare*, the cassette tutorial with the keyboard template thrown in, $30.

The FlipTrack cassette tutorial also works well, the Micro Instructional tape is acceptable, and the Personal Tutor Associates tapes are idiosyncratic but technically sound. Their inclusion of an examples disk is a plus.

Buying a disk tutorial program when one comes with *1-2-3* is tough to justify. The ATI and ASI tutorials are essentially the same program; the ATI tutorial *PC* saw ran only in black and white, while the ASI ran better in color. That problem may be fixed by now.

The quality of the two videocassettes by Computer Labs and ANDERSON SOFT-TEACH was about equal. Both had problems with clarity of screen displays.

For people in business with specific plans for using *1-2-3*, one of the applications books or disk tutorials such as *The Power of: 1-2-3*, *The Power of: Financial Calculations for Lotus 1-2-3* or Cdex' *Managing Your Business Using the Lotus 1-2-3 Program* makes sense. Double-check to see that your specific application is covered, and if an examples disk is optional, spend the extra money for it.■


A

COVER STORY

Functions: Keep Your Eye On The Ball

No matter how well designed an integrated software offering may be, its individual programs must do their jobs well for the package to be worth its price. Here are in-depth examinations of how well the four major business functions—spreadsheet, database management, word processing, and graphics—work in five commercially popular integrated packages.

Illustration: Dave Calver



Thumbing Through the Spreadsheets

The spreadsheet modules of five integrated packages all do pretty much the same job—but some do it better than others.

Lotus' *1-2-3*, the ITSoftware series, *SuperCalc*^{3}, *VisiCalc IV*, and *SeriesOnePlus*—wherever else these five integrated programs may be skimpy, their spreadsheets are loaded with powerful features. A glance at the comparative chart (see sidebar, "Putting Spreadsheets Side by Side") is enough to show the range and versatility that most of them offer. But charts, however useful, don't convey a program's personality, and though all spreadsheets set out to do the same job, they all do it differently.

Some of these spreadsheets have gone through several versions and have been polished to a smooth finish. Others seem to have appeared *de novo*, yet they have all the features anyone could ask for. Happily, with the exception of *SeriesOnePlus*' cranky Execu/MODEL software, it's hard to go wrong with any of these spreadsheets. Most users probably won't scratch the surface of their capabilities. Having to choose between *1-2-3* and *SuperCalc*^{3} is a little like having to choose between a Maserati and a Lamborghini. Either one is



far more than you'll ever need for tooling around town.

Each of these programs has ardent defenders who think the rest are rubbish. Such partisans will doubtless be offended when I pass over in silence some feature that they think sets their darling off from the rest. But an item-by-item comparison of every feature of each of these sophisticated programs would fill a book. What follows, therefore, is an inevitably subjective and hardly exhaustive account of some of the spreadsheet features that don't fit conveniently into the comparative chart.

Lotus' 1-2-3

For power and ease of use, *1-2-3*'s spreadsheet is hard to beat. Other programs do some things that *1-2-3* can't, but none seems to have been designed with comparable attention to detail and care for the user.

1-2-3's command menus are the easiest to use of all five spreadsheets. The initial slash (/) command brings every command choice to the screen as a full word, not just as a string of one-letter abbreviations. You can then choose from among those commands, either by typing its first letter or by moving the cursor to it with the arrow keys and hitting the Enter key. Subsequent choices are likewise spelled out and can be selected in the same way.

If you are ever confused, the F1 key will bring up one of more than 200 context-sensitive help screens. *1-2-3*'s help facility is one of the most extensive and useful I have ever seen. Each screen is cross-indexed to other screens, and you always have the option of reviewing earlier help screens, looking at additional screens, or returning to the point where you left off.

1-2-3's spreadsheet program also has the best method for indicating which cell addresses are to be replicated as absolute addresses and which are to be replicated relatively. By stroking a single function key, leading dollar signs are tacked onto cell addresses to make them absolute. This choice is also made at the most logical moment: while the formula is being entered into a cell. It is while the formula is being constructed that you are most likely to remember which cell references should be absolute or relative. Programs like *SuperCalc*^{3}, *VisiCalc IV*, and *CalcIt* put a greater demand on the user by making him choose between relative and absolute after he has finished constructing the formula.

1-2-3 is also unique in that it allows hybrid cell addresses that are part absolute, part relative. A1 would be a fixed, unchanging address, whereas A$1 and $A1 are hybrids that fix either the row or the column. You may not often need these mixed addresses, but they are a godsend when you do.

1-2-3 also lets you indicate cell ranges more flexibly than with any of the other programs. It is the only spreadsheet in the group that lets you "expand" the cursor to visually identify all the cells in a range, and it's the only one that lets you give an English name to an entire range.

The program is loaded with other nice touches. If you want to name a group of cells, there is a procedure that lets you use the labels you have already typed into your spreadsheet as names for the values in adjoining cells. If you end a number with the percent sign (%), the program automatically divides by 100 and enters the right decimal value. The screen always displays the status of the CapsLock and NumLock toggles so you are never taken by surprise. It also reminds you if you have suspended the automatic recalculation feature, so you will know to hit the CALC command after you change values. It has a handy Data Fill function that fills succeeding cells with a series of numbers, beginning with any number you specify, and incrementing it each time by whatever other number you specify. The program has a useful function for every function key. Finally, it comes with an interactive disk tutorial that does a good job of teaching you *1-2-3* basics.

CalcIt builds spreadsheets not just in rows and columns, but in pages as well. In effect, it creates a data "cube" rather than a sheet.

And now for some complaints. It takes four full strokes to blank out the contents of a single cell. Two or three should do the job. Also, you cannot do a real directory listing from within the program. You can see only two lines of *1-2-3* files on the screen at one time, and you can't get a listing of non-*1-2-3* files.

1-2-3 lets you set up to 26 keyboard macro commands that are invoked by hitting Alt with a letter key. They can be a big help, but they're not as easy to program as *VisiCalc IV*'s macros. With *1-2-3*, you can't simply enter the keystrokes as you would if you were using the program. Instead you must write a kind of code: Cursor movement keystrokes must be written as {Down} or {Right}, and function keys must follow a similar notation. Macros are always stored along with the worksheet for which they were designed. Thus, if you have set up a budgeting model that uses some peculiar labels and formulas, you can enter them instantly with an Alt-letter combination, but those macros will work only while you are using the spreadsheet for which they were written.

For more advanced applications, keyboard macros can be combined with *1-2-3*'s /X series of commands to create a simple programming language. You can create interactive macros, AUTOEXEC macros, and complex procedures containing IF-THEN statements, GOTO commands, loops, and subroutine calls. These advanced macros can be of any length. For ease in debugging, macros can be set to execute one step at a time. This way you can see exactly what your program is doing and correct its faults.

Lotus has given us a top-notch spreadsheet. No wonder it sells so well.

CalcIt

CalcIt, the spreadsheet module in ITSoftware's integrated series, was adapted under license from Datamension Corporation's *Report Manager*, Version 1.06 (see "Report Manager: Not Just Another Visiclone," *PC*, Volume 2 Number 6). Both programs suffer from the same peculiar weaknesses, but *CalcIt* offers something that none of the other four spreadsheets even attempts: three dimensions.

CalcIt manages this by building spreadsheets not just in rows and columns, but in pages as well. In effect, *CalcIt* creates a data "cube" rather than a sheet, with similarly constructed spreadsheets stacked on top of each other, just like pieces of paper on a desk. Thus, each *CalcIt* cell has a third address element, the page letter, and data can be replicated from page to page as well as within a single page.

This arrangement is especially convenient for analyzing data that is compiled in repeating cycles. For example, if you need to do quarterly or monthly reports for each year, you can put each year's work into succeeding pages of the data cube. That

Putting Spreadsheets Side by Side

This chart summarizes the debits and credits of the spreadsheet components of five integrated packages.

Items preceded on this chart by a caret sign (^) have the following explanations. A discussion of the Time Trials at the end of the chart follows.

Cursor control by content. Lotus' *1-2-3* lets you move the cursor from within a column or row of nonblank cells to the first blank cell at either end of that column or row. Likewise, if the cursor is in an area of the worksheet that is blank, the same command will move it to the first nonblank cell, in either direction, in that column or row. This is an easy way to move around the worksheet. *SuperCalc*[3] lets you issue a global command that lets you move the cursor only to cells that are blank and unprotected.

Enter cell contents by cursor movement. Some programs let you "enter" data into a cell by hitting a cursor-control key. With a single stroke you can both enter the data *and* move the cursor. This is a time-saving procedure that is very helpful when you have a whole row or column of data to enter.

Undo complex commands one step at a time. Complex spreadsheet commands may require four or five steps. If you make a mistake while entering a command, some programs let you retrace your steps, correct the mistake, and then resume the command. This is much quicker than canceling the command entirely (all of the programs let you do this) and starting over again.

Different global formats. Some programs let you set different global formats in different spreadsheet windows. Thus, if you wanted to, you could look at the same spreadsheet in, say, integer notation in one window and with six decimal places in the other.

Deletion recovery. All the programs

	Lotus	Visi	Super	Ser.1	CalcIt
Max Work Area	256C/2048R	63C/254R	63C/254R	64C/254R	255C/254R/254pages
Col Width Range	1-72	3-77	1-127	1-60	1-127
Each width adjustable	Y	N	Y	Y	Y
No. rows on screen	20	21	20	18	23
CURSOR CONTROL					
By address	Y	Y	Y	Y	Y
By Page	V & H	N	N	V & H	Y
To home	Y	Y	Y	N	Y
To end of worksheet	Y	N	N	N	Y
^By content	Y	N	Y	N	N
^Enter cell contents by cursor movement	Y	Y	N	Y	N
Strokes to blank one cell	4	2	3	3	3
^Undo complex commands one step at a time	Y	N	Y	N	Y(almost always)
Indicate toggles on or off	Y	N	N	N	N
Titles (freeze)	C & R	C & R	C & R	C & R	C & R
Split Screen	V & H	V & H	V & H	V & H	V & H
No. of Screens	2	2	2	2	4
Scrolling	Sync & Async	S & A	S & A	S & A	S & A
^Different global formats	Y	Y	Y	N	N
Help Screens	Y	N	Y	Y	Y
Context Sensitive	Y		Y	N	Y
Cross Indexed	Y		N	N	N
^Deletion Recovery	N	N	N	N	N
No. of numeric formats	5	3	12	3	4
^Label formats	Lft,Rt,Cen,Rpt	L,Rt,Rpt	L,Rt,Rpt	L,Rt,Rpt	L,Rt,Rpt,C
^Labels extend to next cell	Y	N	Y	N	N
RANGES					
^Indication	Address,Cursor,Name	A,Crs	A,Crs	A	A
Named ranges	Y	N	N	N	Y(single cell only)
Max range name	15 char.				8 char.
Copy more than one C or R	Y	N	Y	Y	Y
FORMULAS					
^Entered by:	Cursor,Address,Name	Crs,A	Crs,A	A	A,N
Absolute/Relative	Y	Y	Y	Y	Y
Mixed (Abs/Rel)	Y	Y	Y	Y	Y
Mixed by cell	Y	N	N	N	N
Auto or Manual Recalc	Y	Y	Y	Y	Y

	Lotus	Visi	Super	Seri	CalcIt
^Variable calc order	Natural,Col,Row	C,R	C,R	C,R	Natural
Cell protection	Y	N	Y	N	N
Visual indication of Prot.	N	Y(half intensity)			
^Hide cell contents	N	N	Y	N	N
Calendar Arithmetic	Y	N	Y	N	Y
Display remaining memory	Y	Y	Y	Y	Y
Display format status	Y	N	Y	N	Y(each cell)
Display formulas in sheet	N	N	Y	N	Y
Save partial spread sheet	Y	N	Y	Y	N
Overlay spread sheets	Y	Y	Y	Y	Y
Add or Subtract sheets	Y	N	Y	N	N
Mult. or Div. sheets	N	N	Y	N	N
Join without overlaying	Y	N	Y	Y	N
^Warn against overwrite	Y	Y	Y	N	Y
^Choose file extensions	N	N	Y	N	Y
^Non-alphanumeric chars. in file name	1 only	0	Many	Many	Many
NUMBER Of FUNCTIONS					
Math	17	12	15	7	16
Logic	5	8	6	1	0
Finance	5	1	5	1	11
Date	5	0	8	0	2
Statistics	7	5	5	5	10
Other	5	N	8	0	5
OPERATORS					
No. of Log. & Arith.	14	13	12	11	11
Exchange files with:	DIF,dBase II	DIF	DIF,dBase II,other	Ser.1	IT Package
Import only:	VisiCalc		VisiCalc		
Keyboard Macros	Y	Y	N	N	N
Stored with WS or separately	W	S			
Interactive Disk Tutorial	Y	N	N	N	N
Copy protected	Y	Y	N	N	N
Backup included	Y	N			
Time Trial (in sec.)	5	126	37	72	18

Abbreviations: Y = Yes, N = No
V = Vertical, H = Horizontal
C = Column, R = Row

let you wipe out large chunks of a spreadsheet. What's gone is gone. None has a deletion recovery procedure.

Label formats. Depending on the program, labels can be right-aligned, left-aligned, or centered in their cells. The Rpt. notation means that a character can be repeated through every space within a cell. If, for example, you want to draw a line through a cell, the repeat command is easier to use than hitting the hyphen key a dozen times. *CalcIt* lets you center labels vertically or horizontally on the screen—a unique feature—but does not allow centering within cells.

Labels extend to next cell. All of the programs let you enter text that is longer than a cell's width. Some will then display only that portion of the text that will fit in the cell, while others will thoughtfully let a label spill over into any adjacent blank cells.

Range indication. This is how you tell the spreadsheet what cells you want something done to. Depending on the program, you can indicate a range of cells by name, by cell addresses, or by moving the cursor over the cells. *1-2-3* lets you name a range of any size; *CalcIt* lets you name only the smallest ranges: single cells. The rest don't let you name ranges at all.

Formulas entered by. How do you tell the program which cell's contents are to be part of a formula? The options are the same as when indicating a range.

Variable calc order. Most spreadsheets do their calculations by plodding through the model, column by column or row by row, doing the necessary arithmetic for each cell. Both of these methods can give incorrect results if a cell's value is calculated before that of another

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cell on which its value depends. The option of changing the calculation order from column by column to row by row will catch most such errors but not all.

The only way to guarantee correct results every time is to use a recursive approach, which in Lotus' *1-2-3* is called the "natural" calculation method. Whenever the program finds a cell whose value depends on the value of another cell, it goes to that cell and computes its value first. If that cell in turn depends on yet another cell for its value, the program will once again interrupt the calculation process and solve for the value in the third cell.

CalcIt solves for values in precisely the same way. Thus, it and *1-2-3* let you put sums at the top of a column, the beginning of a row, or wherever else you like. Calculations and recalculations will always give the correct answer. Lotus' *1-2-3* also lets you calculate by column or row if you prefer.

Hide cell contents. *SuperCalc*^{3} lets you format cells so that their contents will not be displayed with the rest of the spreadsheet. However, if you move the cursor to those cells, the value or the underlying formula is displayed.

Warn against overwrite. Most programs will warn you if you are about to destroy a disk file by saving the current spreadsheet with a name you have already used before.

Choose file extensions. Some programs force their own extension onto any file you create. Others let you make up your own.

Nonalphanumeric characters in file name. Some programs let you use only letters and numbers in file names, while others let you use most any character on the keyboard. Lotus' *1-2-3* only lets you use the underline mark (_) in addition to alphanumerics.

Time Trials. Speed of calculation isn't usually a big concern for spreadsheet users. Most applications just don't require that much calculation time. It takes a knotty problem to make a spreadsheet sweat, but some sweat a lot more than others.

We devised a simple time trial to see which programs did the quickest math. In cell B1 we entered a formula to calculate the square root of the value in cell A1. We copied this formula into every cell bounded by B1 to Z1 and B10 to Z10—250 cells in all. Then we entered the number 10 into cell A1 and counted the seconds while each program stupidly found the square root 250 times.

The differences in speed were amazing (see comparison chart). *1-2-3* is the hands-down winner; it did the job in a brisk 5 seconds. At 18 seconds, *CalcIt* is pretty quick too, but we discovered that it doesn't bother to work out the answers for cells that don't appear on the screen. If we moved around the spreadsheet and looked at a fresh screenful of cells, we had to wait another 18 seconds while *CalcIt* worked out the answers again.

Lotus' *1-2-3* is so much faster than the others that we wondered if it had somehow figured out that all it needed to do was find the square root of 10 once and then copy the answer into all the other cells. We came up with some clever ways to make sure it wasn't doing that, but it made no difference. *1-2-3* found the square root of 250 different numbers just as quickly as it found the square root of one number 250 times. Hats off to Lotus.—**J.T.**

way, if you want to compare year-to-year information, the PgDn and PgUp keys will take you into and out of the cube as you view figures for the different years. This is a lot handier than fumbling with enormous two-dimensional spreadsheets or reading new files in from disk.

Better yet, the data cube can be "split and rotated" so that rows or columns in

> The CalcIt manual makes frequent and effective references to sample data cubes that are supplied on disk.

succeeding pages can be compared side by side. In the standard "page" view, each year's figures would appear together. But if you like, you can "split" the cube along any column and "rotate" the newly created "surface" into view. This way, instead of comparing quarterly figures for the same calendar year, we could compare, say, second quarter figures for a series of years. By "splitting and rotating" along a row, we could stack up and compare the equivalent rows from each of a series of spreadsheet "pages." This 3-D feature is very powerful and makes *CalcIt* an attractive package no matter what your application.

CalcIt's preprogrammed functions are also convenient. Most spreadsheets require each function to be preceded by a marker typed in by the user. *1-2-3* and *VisiCalc IV*, for example, use the @ character, as in @sum(A5...A11). *CalcIt* recognizes functions without a preceding character (as does *SuperCalc*^{3}), so you can dispense with typing in a marker when you enter formulas.

Also, *CalcIt*'s more sophisticated preprogrammed functions are not invoked by the usual procedure of filling parentheses with values and cell addresses. Instead,

you call up an interactive file from the program disk, which prompts you for the cell addresses of the values that the function acts upon. The necessary formula and the resulting solution are then automatically entered into the cell that you specify. This method takes a little longer than typing a list of cell addresses, but is is less confusing and practically foolproof. When a function, such as Linear Regression or Trend Line Analysis, requires a large number of variables, it is much more convenient for the program to prompt you for the necessary values than it is to enter them sequentially into a formula. Thirteen of *CalcIt*'s 44 functions are invoked in this handy, interactive fashion.

Like *1-2-3*, *CalcIt* comes with a programming language that includes loops, subroutines, and conditional statements. Its code is no snap to learn but more closely approximates actual spreadsheet commands than *1-2-3*'s /X language does. Better yet, these EXEC language files are stored in pure ASCII, so programs can be written with EDLIN or any word processor that can create ASCII files. EXEC programs cannot be invoked as keyboard macros, but they can be designed to execute automatically and to produce interactive screens for data entry by unsophisticated users.

Another nice *CalcIt* touch is a partial solution to the label versus formula problem. All spreadsheets can be confused by formulas that look like labels and vice versa. If you find that *CalcIt* has misinterpreted a cell's contents, you can identify them as text or numbers with a single keystroke. You don't have to go back into the program's edit mode to correct the error.

But alas, *CalcIt* has its problems. It uses only one of those ten marvelous function keys and gives you no way to program the rest. The cursor commands that take you straight to cell A1 or to the end of the data cube are two-stroke "slash" commands, not single keystrokes. The GOTO command, which sends the cursor to any address in the cube, is, of all things, the "at" sign (@), another two-stroke process. Having gotten rid of the "at" sign for its functions, why did *CalcIt* have to invite it back? The program's disk directory feature is even weaker than *1-2-3*'s; from within *CalcIt* you can only examine disk file names one at a time. But at least



SuperCalc³ doesn't wow the crowds with flashy features like 3-D or unlimited keyboard macros, but its spreadsheet has some of the best utility features of all.

the directory will cycle through every file on the disk and display files other than those in *CalcIt*.

Finally, the program sometimes operates slowly. The display refresh is a little balky, so that when you scroll the screen with cursor keys, the display can't always keep up. Also, many slash commands require a disk access in order to execute. Fortunately, you can type ahead with the rest of your command and the program will catch up. Like most spreadsheets, *CalcIt* does not spell out your command choices but instead gives you a string of one-letter mnemonics to choose from. Effective help screens are always on call for the confused, but mnemonics are harder to learn than fully spelled-out commands.

The program does not give you an interactive tutorial, but the manual is usually clear and makes frequent and effective references to sample data cubes that are supplied on disk.

In spite of these shortcomings, this is a solid product. Datamension has already released version 2.0 of *CalcIt*'s progenitor, *Report Manager*, so we may soon be seeing improved versions of *CalcIt* as well.

SuperCalc³

Sorcim's *SuperCalc* has been around for a long time, and this version is the best ever. It doesn't wow the crowds with flashy features like 3-D or unlimited keyboard macros, but its spreadsheet has some of the best utility features of all.

You can, for example, do a complete disk directory from within the program. The screen also maintains a constant display of the lowest, rightmost cell coordinates in your worksheet, so you always know how large the spreadsheet is. You can also display formulas instead of values in each spreadsheet cell, which is a big help in tracking down bad formulas.

*SuperCalc*³'s spreadsheet program also has some of the most flexible formatting options of the five. In addition to its four standard numeric formats, it lets you set up eight different numeric formats of your own. You can specify the number of decimal places, establish scaling factors, choose whether negative numbers should be in parentheses or start with a minus sign, or decide if you want your numbers to include floating commas. These preestablished formats can be called up at any time.

This program is the best of the five at

telling labels and values apart. Rather than looking only at the first character of an entry to determine whether it is text or numbers, *SuperCalc*^{3} looks at whole words. Thus it knows that Q88+K19 is a formula even though it begins with a letter. You don't have to start the entry with a plus (+) or minus sign (−) or some other symbol to indicate that what follows are numbers. Of course, if you were perverse enough to use Q88+K19 as a label, *SuperCalc*^{3} would get confused and think it was a formula. However, it is smart enough to know that Q888+K19 is a label and not a formula. How does it know that? *SuperCalc*^{3} doesn't have 888 rows, so the program knows that Q888 can't be a cell address. This ability to parse cell contents is a feature that would improve any spreadsheet.

SuperCalc^3 is also the only spreadsheet of the five that can take the contents of two spreadsheets and multiply the corresponding cells by each other or divide them into each other. It can even do this with a simple /C (copy) or /R (replicate) command. You can choose to copy values instead of formulas, and if the cells to which you are copying already contain data, you can choose to add, subtract, multiply, or divide.

SuperCalc^3's spreadsheet program comes with two other features that are unique: a Verify program and a Maintain program. Verify can be run on your program disk at any time and will indicate whether or not your files are intact. If the program ever starts behaving strangely, you can quickly find out if you have a damaged disk. The Maintain program is a kind of customized DEBUG. Sorcim will send you printed "cookbook" instructions that explain how to use Maintain to update your program—a clever idea, if it works.

Though the program does not include a disk tutorial, it comes, like *CalcIt*, with useful example files that are well integrated with the manual's excellent tutorial. *SuperCalc*^{3}'s manual is probably the best of the five. *SuperCalc*^{3} also has a programming language of /X commands that can be used to create autoexecuting files and interactive data-entry screens, but the language does not appear to be as powerful as *1-2-3* or *CalcIt*'s.

On the debit side, *SuperCalc*^{3} uses only four function keys. Since it does not support keyboard macros, there is no way to program the other six.



Having to choose between 1-2-3 and SuperCalc^3 is a little like having to choose between a Maserati and a Lamborghini.

Another quibble: It takes the two-keystroke colon (:) to indicate a cell range [A1:A6] rather than the usual one-keystroke period [A1.A6]. Why make things harder than necessary?

Finally, *SuperCalc*^{3}'s commands sometimes seem a touch awkward. It's wonderful, for example, to be able to load and save partial spreadsheets, but it's irksome to always have to respond to an "All or Partial" prompt every time you load or save. It would be more convenient if the program always assumed you were dealing with whole spreadsheets unless instructed otherwise. Occasionally, the very wealth of the program's features complicates its command sequences.

VisiCalc IV

VisiCorp's *VisiCalc* is the grand old master of spreadsheets. The latest version, *VisiCalc IV*, does some clever tricks that other programs can't, but it still hasn't picked up some of the jazzier features that are now becoming standard. There is a disappointingly large number of "No"s in the *VisiCalc IV* column in the features comparison chart—no individual adjustment of column widths, no calendar math, no help screens, no cursor movement by page, no nonalphanumerics in file names, no block copies, no saving and loading of partial spreadsheets. *VisiCalc IV* has all the standard workhorse functions, but not much razzmatazz.

Defining absolute and relative cell addresses is more awkward with *VisiCalc IV* than with any of the other programs. Every time you replicate formulas, the program parades every cell address across the command line and prompts you to tell it which ones are to be replicated relatively and which are not to be changed. If you are replicating a whole row or column of formulas, this can be tedious business. *SuperCalc*^{3} and *CalcIt* at least give you the option of telling the program that *all* cell addresses will be either relative or absolute. Only when there is a mixture of the two do they likewise march cell addresses across the command line and prompt you to baptize each one as relative or absolute. As we saw earlier, *1-2-3* has an even more elegant solution.

There may be a good reason why a few features have been left out: The disk actually comes with three different versions of the program—64K, 128K, and 192K. The smaller versions don't contain the more advanced graphics, data management, and keyboard macro features, but they are perfectly functional spreadsheets.

And just because you have 192K or more doesn't mean you'd never use the smaller versions. If you were building an enormous spreadsheet and didn't need the advanced commands, you might prefer to use a smaller version because it would leave more memory for the spreadsheet.

VisiCalc IV is also unique in that it loads completely into memory. While it is running, it never has to go back out to disk for overlays. That makes it the perfect spreadsheet for systems with only one drive; once you have loaded *VisiCalc IV* you can take out the program disk and put in your data disk. The program thus runs on small systems with limited memories, but it can also take advantage of more lavishly configured machines.

One thing that *VisiCalc IV* handles much better than any other program is keyboard macros, which it calls Keysaver commands. There can be as many as 67 running at any one time, and they can be saved in files of their own. Thus, if you have programmed your function keys to perfection (you can use Shift-F1, Alt-F1, and Ctrl-F1 as well as plain old F1) you can save those functions in a file and call them up to use with any spreadsheet. A Keysaver comand can even call another whole file of macros, so it is easy to build up interactive screens.

VisiCalc IV's macros are, moreover, almost unbelievably easy to program. There is no code to learn; macros are made up of exactly the same keystrokes you use to operate the program. What's more, you can watch the results of your keystrokes as they are being read into a Keysaver command. That means you know immediately whether or not the macro will do what it's supposed to. *VisiCalc IV* does not offer a language that loops and does subroutines, but its Keysaver commands are just about the slickest feature yet to be stuck onto a spreadsheet. It's a pity the rest of the program doesn't measure up.

Execu/MODEL

SeriesOnePlus' spreadsheet component, *Execu/MODEL*, is a doggy piece of software that does not stand up against the rest. Though it does not fare badly in a strict, point-by-point comparison (see comparison chart) it is riddled with irksome features that greatly limit its appeal.

For example, some *Execu/MODEL* commands are invoked by the usual slash (/) command, but others are initiated by the curious method of hitting either the End key or F10. For End key commands, you enter your option choices at the bottom of the screen; for slash commands, at the top. Other programs have sense enough to keep their command lines in one place.



Execu/MODEL is a doggy piece of software that does not stand up against the rest.

Many commands are plain clumsy; often they are strung onto the same sequence, so you can't execute them without cycling through a series of questions about other commands. Even if all you want to do is change the width of a column, you have to submit to a lengthy interrogation about how you want text formatted, how many decimal places numbers should have, whether they should be right- or left-aligned, and so forth. In all, you have to answer five different format questions, a procedure that takes a dozen keystrokes.

Unlike the other spreadsheet programs, *Execu/MODEL* is written so that the Enter key must be hit every time a command selection is made. Even a simple Yes/No prompt must be sent on its way with the Enter key, so complex commands require approximately twice as much work as with better designed programs. It takes five keystrokes, for example, just to blank the screen.

The program uses all ten function keys, but three of them are duplicated by other keys such as PgUp and PgDn. The GOTO command would have been a good candidate for one of those redundant function keys; it is an awkward, two-stroke sequence: /=. The Home key, as you are likely to discover to your surprise, produces *Execu/MODEL*'s skimpy, context-insensitive help screens.

For added eccentricity, the Backspace key does not wipe out the previous character when you are typing cell contents. Instead, it enters what you had intended to correct and moves the cursor one column to the left. The destructive backspace is, of all things, the Del key. Preprogrammed functions have the following quirky format: (SUM(A1:A10)). Note the double parentheses at the end. Note also that the range delimiter is the two-stroke semicolon rather than the more usual, one-stroke period. And there are other tiresome features to this program, such as a display refresh that takes almost a second and a half, and a manual that seems deliberately arcane.

If the *SeriesOnePlus* database and word processor were dazzingly good, you might be willing to put up with the only spreadsheet that is compatible with them. Sorry, but they're not. If you're in the market for a good spreadsheet program, *Execu/MODEL* is one that you should avoid. ■

Touching Base With Database Managers

Though an important function, data management is mere window dressing for some integrated packages.

Most integrated software packages are a mixed bag of marketing positions and performance claims, especially in the database management area. Our benchmark, *1-2-3*, is an integrated product that claims to have data management capabilities in one master program that is based on a spreadsheet. *SuperCalc*[3] and *VisiCalc IV* are expanded and enhanced versions of earlier spreadsheet programs; some data management commands have been added to each. *SeriesOnePlus* and the IT series, from ITSoftware, are, to varying degrees, integrations of basically free-standing programs. Common command structures and other techniques tie them together.

The data management capabilities of the programs, and their price tags, cover a wide range. One or two of these programs deserve to be considered database managers in the classic sense, which means they are capable of handling essentially unlimited amounts of data in sophisticated ways. Others, on the other hand, have just added a bit of window dressing to a



spreadsheet and can accommodate only limited amounts of data and manipulate it in only simple ways. Remember that a database is simply a collection of information stored in some structured manner; the database manager's job is to add, modify, and retrieve the information in flexible and useful ways.

1-2-3

1-2-3, from Lotus Development Corporation, is the best-selling program claiming database management capabilities. The inclusion of data manipulation in *1-2-3* (as well as in other spreadsheets) was probably motivated by two realizations. First, spreadsheets contain data. Whether that data is numeric or alphabetic, many of the standard operations intrinsic to the spreadsheet concept allow manipulation of data in useful and flexible ways. Second, until recently, true databases used complicated, tree-structured "network" and "hierarchical" models. These models allow extremely sophisticated data manipulation, but they also require careful design, and they can be difficult to understand. Newer "relational" databases use a simple and almost intuitive tabular design. The obvious similarity between tables of data and the appearance of a spreadsheet makes the connection clear.

Any spreadsheet can manipulate data if the columns are viewed as fields and the rows as records. To add records, you use

the spreadsheet's command for inserting rows; to add fields, use the command for inserting columns. The database management commands that perform arithmetic on fields are easy for a spreadsheet, and common spreadsheet functions are useful on various data types.

In this sense, then, any spreadsheet can claim data management functions. But this is not database management in the way the term is usually applied. *1-2-3* includes special commands that take matters several steps further.

Most of the special commands are grouped under the heading Data Commands (/D). The most important is the /DS (sort) command, which allows records (rows) to be sorted by the contents of columns. The user must specify the range of rows to be sorted (it is not necessary to sort an entire sheet), choosing which column to sort on, and indicating whether the sort should be in ascending or descending ASCII order. *1-2-3* also allows a two-key sort, meaning that the sort will be in order of the main, or primary, key column. If the primary and secondary columns are equal, the contents of the secondary column will determine the final order.

1-2-3 includes commands to find, extract, and delete records that match user-defined criteria. The /DQ (data query) command operates over a specified range of cells. The search criterion is entered in another area of the spreadsheet and consists of the field names that all *1-2-3* data sheets must have above each data column, and the conditions to be matched. By entering multiple conditions on one line, an AND connector is established (both conditions must be true for a record to match), while entering conditions on separate lines implies an OR connector. Once the criteria are defined, executing the F (find) command highlights each matching record. The D (delete) command removes matching records.

The E (extract) and U (unique) commands copy any matching records to a predesignated area of the spreadsheet. The extract command moves all matching records, while the unique command moves only unique records and one copy of records with duplicates.

Several special database-oriented statistical functions are included: @DCOUNT gives the number of items in a list; @DAVG returns the arithmetic mean; @DMIN and @DMAX give the minimum and maximum values; and @DSTD and @DVAR provide the standard deviation and variance of the items in the list.

The *1-2-3* /DT (data table) command adds a useful extension to the "what-if" calculations intrinsic to spreadsheets. Tables of numbers can be built using iteration (computer jargon for repetition). The actual process is a bit confusing, but the general idea is to fill a column with values of a variable and tell *1-2-3* to substitute the table values into an equation and display the results in an adjacent column. The /DF (data fill) command is useful for filling a range with values incremented from a starting value. Finally, the /DD (data distribution) command outputs the number of call values within user specified values.

> The database manager's job is to add, modify, and retrieve the information in flexible and useful ways.

These commands are impressive. They allow for on-screen data manipulation that many database managers would be hard pressed to match, at least without complex programming. But *1-2-3*'s data management facilities are limited.

The primary problem is that *1-2-3* stores all sheet data in memory. This means that the size of a *1-2-3* database is limited by your PC's memory. The number of records that can be handled depends on how many fields each record includes, but even in a PC configured with maximum allowable memory, *1-2-3* limits the number of records to around 2,000. This is enough for many home applications (assuming plenty of memory and a limited number of fields), but is inadequate for serious business use. Also, the limitation of a range to 32 cells could be a problem. On the other hand, keeping the entire database in memory results in extremely fast sorts and other manipulations.

1-2-3 works only with the spreadsheet at hand; if the data structure requires the interaction of many data files, *1-2-3* falls short. Quite simply, it isn't a relational database manager in any real sense. The lack of a programming language makes even simple output reporting and label construction impossible.

Nevertheless, even if *1-2-3* can't really be called a database manager, it can be used for many of the same tasks. If a user can live with the limitations discussed above, *1-2-3* can be a real workhorse.

VisiCalc IV

VisiCalc, from VisiCorp, is the granddaddy of all spreadsheets. The claims about how many computers were sold just to use *VisiCalc* are true. *VisiCalc* was one of the few unique concepts to emanate from the computer field, and its imitators and successors underscore how important this pioneer has been.

However, time marches on, and many people feel *VisiCalc* has been outdistanced by its competitors, most notably *1-2-3* and *SuperCalc*. VisiCorp's response has been the release of *VisiCalc IV*, an enhanced version. While VisiCorp makes no major data management claims for this version, the documentation does claim that *VisiCalc IV* is a "visual database," and the program makes some provision for data manipulation.

The major upgrade in *VisiCalc IV* involves a series of "star" commands for graphics, a form of keyboard macros and data management. The star command for data is /*M (move), with several subsidiary options. A /*MS (sort) option sorts

columns (not rows) and can work with only one column key (not two as *1-2-3* can). The useful /*MR (rearrange) option allows groups of rows or columns to be moved around the spreadsheet easily. Some of the movements possible with the rearrange option could be done in other spreadsheets; others would be difficult or impossible.

VisiCalc IV includes a criterion definition and collect feature similar to, but more limited than, *1-2-3*'s. The user defines selection criteria in response to screen prompts rather than by entering them in an area of the spreadsheet. Records can be equal to, greater than, less than, or between two specific labels or values. Once the criterion definition is complete, the /*MC (collect) command moves matching records to the top of the spreadsheet; there is no provision for defining a separate output area for the results. There is no analog to *1-2-3*'s U command; all matching records are selected.

One nice wrinkle is that *VisiCalc IV* can make the results of move commands either temporary or permanent, and this distinction can be changed on the fly. This allows sorting the sheet in a certain way, seeing the results, and then returning to the original sequence of rows. When everything is as desired, the changes can be written to disk and made permanent.

These commands are unquestionably useful extensions to earlier versions of *VisiCalc*, but, unfortunately, they don't match even *1-2-3*'s limited data management abilities. Even worse, *VisiCalc IV* limits the number of available rows (and thus records) to 254. As a database manager, *VisiCalc IV* is out of the running.

SuperCalc³

SuperCalc, from Sorcim, was the first major challenger to *VisiCalc*, primarily because *VisiCalc* would run only on specific hardware with memory-mapped video, while *SuperCalc* worked on nearly any CP/M-compatible computer. *SuperCalc* was also more functional and flexible than *VisiCalc*.

The company's latest release, *SuperCalc³*, is clearly modeled on *1-2-3*. Like *1-2-3*, *SuperCalc³* claims integrated graphics and data management, and runs only on PC-compatible computers.

The new release adds an /A (arrange) command that sorts either complete or partial rows or columns (a more flexible approach than *1-2-3*'s). Strangely enough, however, the sorting order is not the normal ASCII sequence. *SuperCalc³* defines its own sequence as the space character, punctuation marks (in ASCII order), the letters (in aAbBcC . . . sequence), followed by the numbers. This is peculiar in that it doesn't follow the almost universal ASCII sequence and it puts the lower-case letters before the upper-case ones. Presumably, Sorcim feels its sequence is closer to the way noncomputer types think things are alphabetized.

> Many people feel VisiCalc has been outdistanced by its competitors.

The specific data management operations in *SuperCalc³* are invoked with a //D (data) slash command. Unlike other *SuperCalc³* commands, the //D submenu remains available until exited (similar to *1-2-3*'s "sticky menu" concept).

The available //D submenu commands are closely modeled on *1-2-3*'s. They are invoked with a single capital letter (slashes are used only to enter the submenu). I (input) defines the range of calls that contain the records and fields; as in *1-2-3*, the top row must be field names. C (criterion) indicates which cells store selection criteria. The concept is similar to *1-2-3*'s, although the exact format of the criteria fields is slightly different. *SuperCalc³* uses AND and OR commands to build complex selection criteria, instead of *1-2-3*'s positional method of indicating connectives.

The F (find) command highlights the first matching record, as in *1-2-3*, and cursor arrows can be used to move to subsequent matching records. O (output) defines an output area of the spreadsheet. E (extract) moves matching records to this output area, and S (select) allows the user to indicate interactively whether a matching record should be moved to the output area or not. Finally, R (remain) leaves the cursor where it is and exits the Data menu; this makes it easy to locate a record with F (find) and return to normal operation.

Obviously, the similarity to *1-2-3*'s data commands is not an accident. Unfortunately, *SuperCalc³* allows only 253 records in a database. The program gamely suggests that "if you need more than 253 records in a given database, the database can be divided into any number of parts (equivalent to any number of spreadsheets)." Thank you very much!

In fairness, this is Sorcim's first pass at adding data management capability to its spreadsheet, and what has been provided works well. But the 253 record limitation remains a killer for many applications.

SeriesOnePlus

SeriesOnePlus, from Executec, features a different concept of software integration. Rather than one large program claiming to perform a variety of functions, *SeriesOnePlus* consists of more or less free-standing programs, such as Execu/FILE, Execu/BUS, and Execu/CALC, that share a common command style. This is certainly not a new idea; both MicroPro and Perfect Software offer families of related products that attempt to maintain a consistent command structure.

SeriesOnePlus, however, has achieved an extremely high degree of command consistency. Almost everything seems to use the same commands. Equally important, the screen presentations of the different program modules are almost completely consistent. Incidentally, the use of color is so well thought out that this is one of the few programs that I would prefer to run on a color monitor, accepting the lower-resolution text display.

The Execu/FILE module of *SeriesOne-*

Plus is a legitimate database manager with a good selection of commands to manipulate data in various ways. Data files are first defined by specifying the fields, their lengths and types, and which fields are to be designated as keys (up to four keys are allowed). The definition process is essentially one of "painting" the layout screen on the video display, similar to the way *DataStar* and similar products work. Execu/FILE is a bit fussy about details, but the basics are simple, and excellent help screens are available. Up to 35 fields can appear on the screen, and this appears to be the limit on the number of data fields in a record as well. Since the screen lines are 80 characters long, this is also the maximum length of a field, a rather serious limitation in some applications, but not too troublesome in normal use. Field names, incidentally, can be up to 30 characters long!

Once the screen is finished, the data file is generated by specifying a wide range of attributes for each field, including data type, number of decimal positions for numeric fields, whether the field will be used in graphics, whether the field is required (must data be entered?), screen display attributes, justification, fill character, and whether the field is a key. A default value can also be established for a field.

Adding records uses the screen layout designed when the data file was defined. The Tab key is used to move from field to field—a style that I personally don't care for. The Return key is much more natural for most typists.

After data has been added, the file must be reorganized, at which point it can also be indexed for faster access (at the expense of disk space for the .NDX file). Data retrieval is easy. A screen appears with the names of the various key fields and a generic Search field. A template of exact or wildcard data is entered where desired and the first matching field is displayed on the defined entry screen. The data can be modified or deleted, and cursor and function keys can be used to move to other matching records. An interesting option locks the cursor position so a series of changes can be made to one field.

A subset file can be created that contains only records that match user-defined criteria. The process of defining the criteria is very straightforward. The field names of all fields in the database are displayed, and the user can select which fields to copy to the subset file and what values determine the match. The normal =, <>, <, <=, >, and >= relational operators are available, and both AND and OR connectives can be used.

A data file can be printed, and Execu/FILE offers word processing-like control over margins, form length, printing of page numbers or headings, number of copies, pausing between pages, and so on. Execu/FILE also allows reorganization of files to change the record format, attributes, key fields, or default data. The reorganization is disk intensive, but it works well.

> SeriesOnePlus consists of more or less free-standing programs that share a common command style.

Execu/FILE's documentation does not indicate any limitation in the number of records that can be stored, implying (as does program operation) that disk storage is the limiting factor.

To use some well-worn phrases, *SeriesOnePlus*' human engineering and user friendliness are simply superb. However, the Execu/FILE module is somewhat simple-minded as complete database managers go. It is really more of a file manager. There are no provisions for multifile access in reports or data manipulation, there are no relational aspects, and there are no mathematical operations. Another problem is the sheer size of the system. The sample Execu/FILE, Execu/WRITE, and Execu/CALC *SeriesOnePlus* system I reviewed consisted of 138 files totalling 1,377K of disk storage. While floppies can be juggled to move from module to module, a hard disk is obviously desirable.

Compared to *1-2-3* and the other spreadsheet data managers, *SeriesOnePlus* is much better at data manipulation. There are full-function database managers that offer more, but within its limitations, *SeriesOnePlus* is excellent.

KeepIT

KeepIT, the core module of the IT program series from ITSoftware, is a full-feature database management program. It is totally free-standing, meaning that it can run without the other IT modules if desired.

KeepIT is almost totally menu- and form-oriented. Defining a database, adding and maintaining data, generating reports, and other standard database manager functions are performed by moving to the correct module from a menu and filling in forms that appear on the screen. Normally, a Master Menu is the focal point of the system and appears at sign-on. Alternatively, a Command File can be specified that will execute a series of previously entered keystrokes. This is similar to the method *VisiCalc IV* uses to capture keystrokes.

The Master Menu offers 29 choices, broken down into File Definition, Data Entry, Data Maintenance, Reports, Interfacing, Housekeeping, and Quit sections. A two-character code is used to choose the desired option.

File Definition is accomplished by filling out a form for each field. The form requests a prompt, a field name, a page (up to nine screens can be defined for a database), the row and column for the field, the field type (alphanumeric, integer, real, and data), the maximum length, a lower (minimum) and upper (maximum) permissible value, and an input specifica-

tion. The input specification asks for a Yes or No to indicate if the field is required, a Skip to pass over the field on initial data entry for subsequent filling, a Default to enter a constant in a field, a Conditional Default to enter a constant in a field that the operator can overwrite with another value, a Previous to enter the value of the field from the previous record, a Transaction Number to increment the value of the field in the previous record by one, or a Formula for a numeric value calculated with a user-supplied formula. The form then asks for a numeric format (specified with BASIC-like symbols, and, finally, the default value or formula if one has been specified.

The screen can also be designed in a flexible and easy-to-use "painting" mode. Other options include assigning passwords to the data file and changing data type. *KeepIT* also allows assigning constraints, which are more complex restrictions on the data entered, and up to 200 "fill values," which reduce keystrokes by assigning the value of one field based on the contents of another (for example, entering a zip code could fill in the city). *KeepIT* can maintain up to three indexes, each on a single field.

This is quite a spectrum of file definition options and the rest of *KeepIT* is equally flexible. Data entry is straightforward, using the screen defined earlier. Data Posting updates the data in one file with information from another file, based on key-field linkage and matching field names. A Verify Data routine compares the data in two files for exact correspondence, useful for critical data entry. Importing data from non *KeepIT* files is relatively easy; fixed-length and variable-length records can be read, as can DIF, SLK (*MultiPlan*), and *CalcIT* files.

KeepIT's Compute/Fill Data routine can make global changes to a file through string concatenation, numeric computation, date computation, or data fill. The *KeepIT* report generator uses a form to specify report characteristics including index order, select criteria, page layout and printer characteristics, column and row subtotals, statistical analyses, and linkages to a second data file for complex reports. Specialized reports are available to tabulate values in selected data fields, to count the number of records in a data file that have a specified set of characteristics, and to generate mailing labels and lists.

Definitions of reports and other *KeepIT* data can be stored in a catalog for later use. In addition, *KeepIT* can print almost any of its stored file and report definitions for archival purposes.

One of *KeepIT*'s best features is how easily it exchanges its data with external programs, both other IT programs and programs from other vendors. The importing facilities mentioned earlier are extensive, but the export of *KeepIT* data is even more powerful. A graphic interface is used to pass data to *Chartman, Fast Graphs, Graph 'n' Calc, 1-2-3, BPS Business Graphics, Graph Writer,* and *Grafox*. The type of chart (pie, bar, or XY) is defined within *KeepIT*, graph items are chosen, and an output data file, directly usable by the external graphics package, is created on disk.

> KeepIT is a powerful package, offering far more flexible and sophisticated data management capabilities than any spreadsheet-related program.

Spreadsheet interface is by DIF file, SLK file for *MultiPlan*, or a special format supplied with the companion *CalcIT* program. Special provisions are made for *UltraCalc* (also available as *EagleCalc*), and the manual gives instructions on converting to *SuperCalc* and *1-2-3* as well. A Mail List interface is provided to transfer data to word processors such as *WordStar, Wordplus-PC, WordPerfect, Wordix, PeachText, EasyWriter/EasyFiler, Spellbinder,* and *WritIT/MultiMate*. Other interfaces include forms for another type of transfer to word processors and Statistics to export to *StatIT* or *MicroStat*.

The File Management selections perform such mundane functions as file renaming and deletion, as well as sophisticated techniques like combining or separating two data files and writing or deleting the intersection of two data files. These latter functions are related to the commands JOIN and PROJECT in a relational database. *KeepIT* also has an internal sort that can sort a data file on up to nine sort fields in either ascending or descending order.

KeepIT is a powerful package, offering far more flexible and sophisticated data management capabilities than any spreadsheet-related program. It is a massive program, yet still reasonably easy to use.

Of course, there are limitations. *KeepIT* can handle 99 fields with a record size limitation of about 2,400 characters, so there's no problem in this area. There are, however, other database managers that can handle more open files in reports, and that include high-level languages for advanced data handling. And *KeepIT* is not a fully relational database. Nevertheless, it is an excellent program that merits serious consideration.

Summary

By now the disparity between the data management capabilities of the programs examined should be clear. *1-2-3, SuperCalc*^{3}, and *VisiCalc IV* are basically spreadsheets. From a database management point of view, *1-2-3* is clearly the most powerful among this group. *Series-OnePlus* contains a good file manager that excels in its user interface, and *KeepIT* is a powerful database manager with unusual and flexible capabilities. As always, potential purchasers must reconcile their own requirements with the features offered by each program. ■

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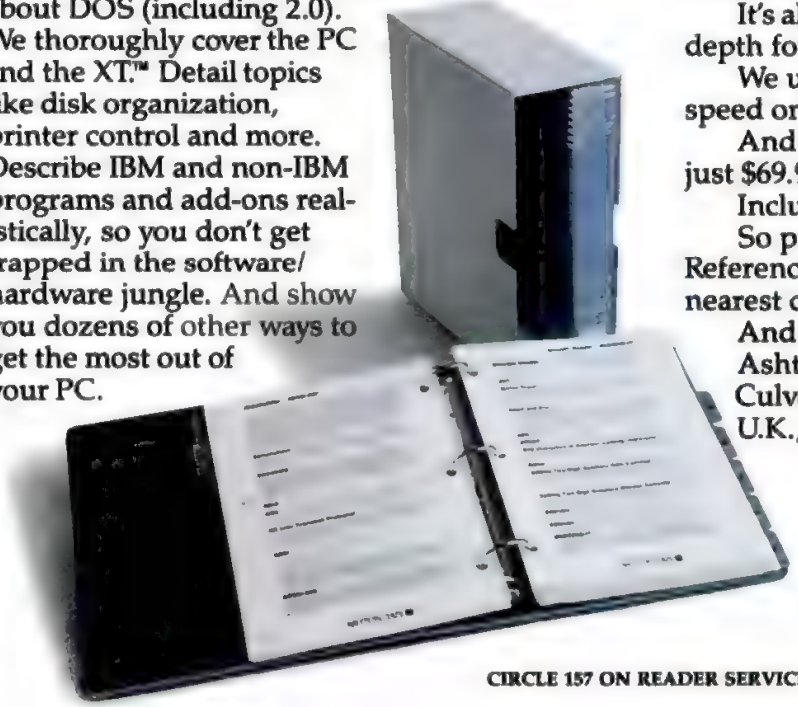
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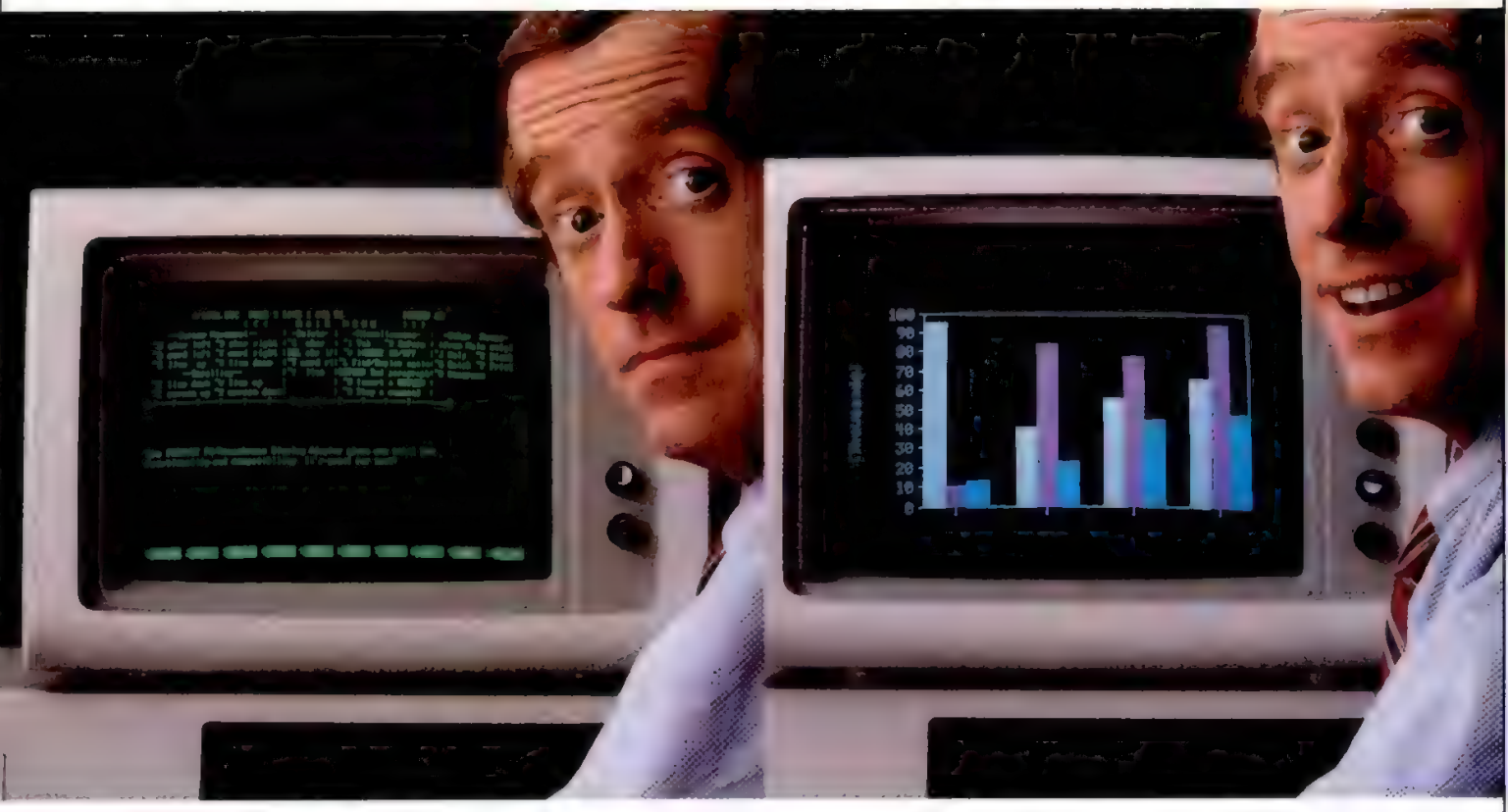
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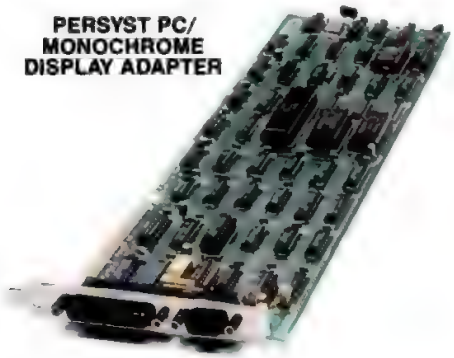
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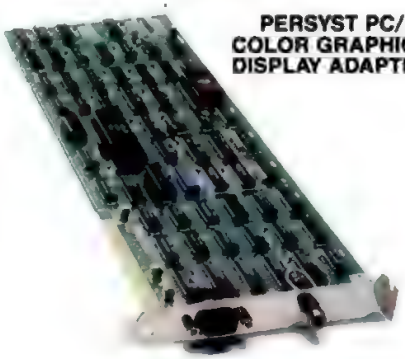
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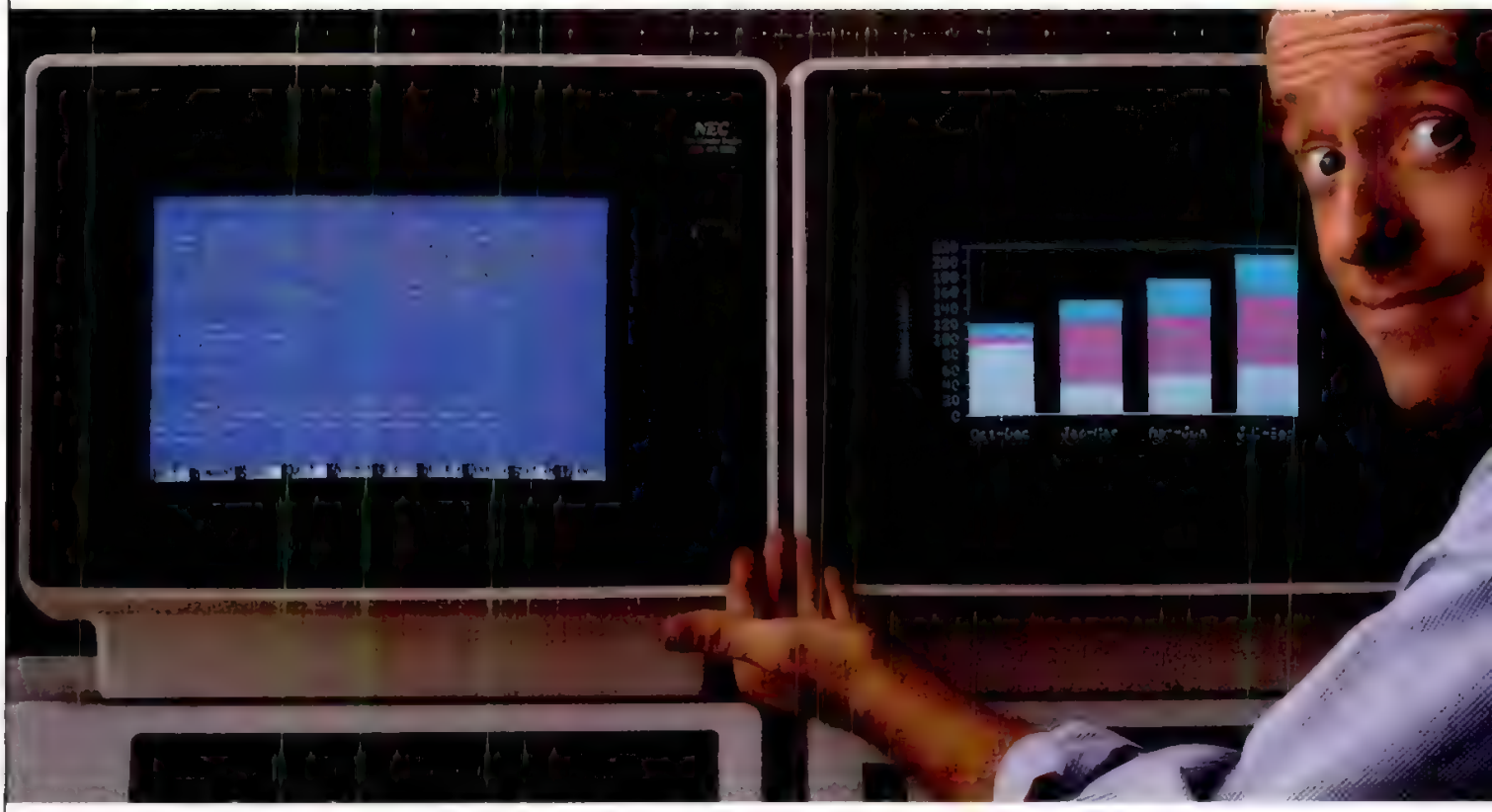
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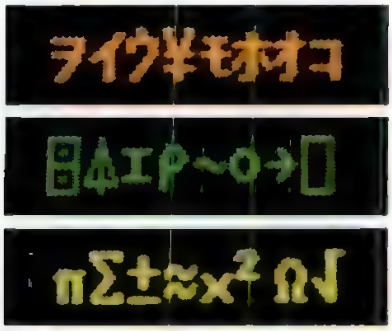
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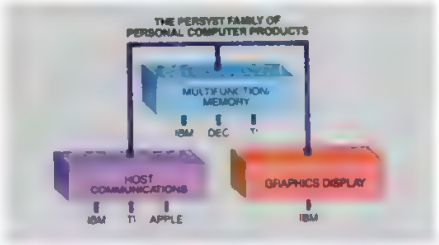
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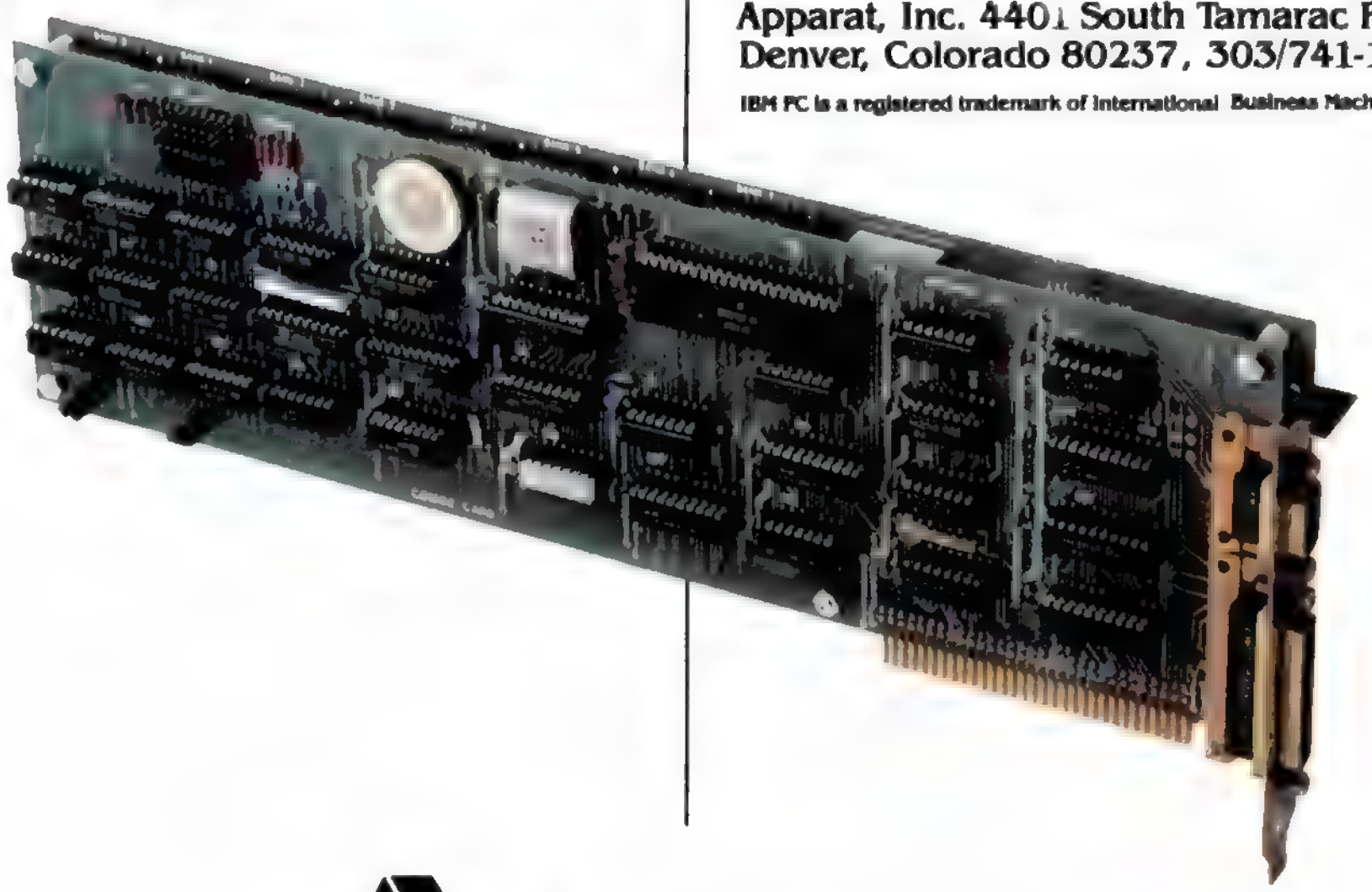
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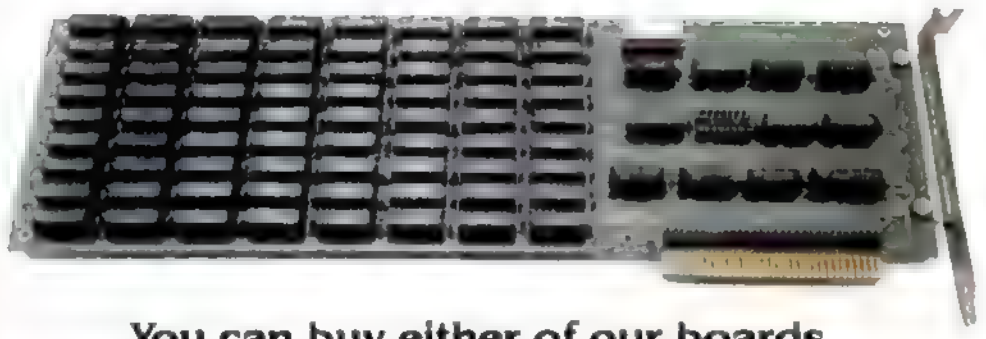
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Two Cheers for Execu/WRITER

Execu/WRITER offers high-quality text processing, but not high-quality word processing, in an integrated environment.

A database and spreadsheet without at least a rudimentary word processor or text handler is like a disk without a computer. There's lots of information with no place to go. The recent trend toward the integration of software addresses this problem of the stand-alone program, but how well? In the case of *SeriesOnePlus*, the report generator Execu/WRITER does an adequate job of weaving its parent program's several elements into an integrated whole, but its weaknesses as a word processor make you wish for more.

Two parts comprise Execu/WRITER's text handler: the Editor and the Formatter. The editing functions are available through a menu. You work with a document in its initial form in the edit mode, which offers various opportunities for onscreen manipulation of text. Edit mode, for instance, supports word wrap, the feature that eliminates the possibility of a word's being split between two lines. Blocks of text can be marked, moved, deleted, and, of course, saved to disk.



Since the text editor does integrate both the database and spreadsheet reports, documents can be read in from disk and appended to the current text. A command is available from the Formatter to print text as it appears in the document.

Execu/WRITER uses the "at" sign (@) as a trigger for formatting instructions, which, of course, precludes its use as a character within the body of the text. You can do simple things to the environment of the document such as define the page size, and most of the more common word processing functions are available, including instructions for indenting, headers and footers, and page breaks.

If this were all Execu/WRITER did, text processing for *SeriesOnePlus* would be as easy as writing on a brick with a felt-tip pen. Execu/WRITER, however, does far better than this, because it includes assignment macros that make it a text handler worthy of your time.

One-word commands can be used to perform functions that, in most of the finer word processing packages, would require multiple-keystroke entries and no small amount of juggling. Three such commands are ITEMIZE, VERSE, and LEVEL. Their use is shown in Figure 1; the results appear in Figure 2. In Figure 1, text is set aside for special formatting with delimiters: greater-than and less-than signs (< >), braces { }, brackets [ ], and

```
@CENTER(Topics of Discussion)

@ITEMIZE<System One Plus
@ITEMIZE<Execuwriter

Execumodeler

Execufile>

Supercalc 3

Visicalc 4

IT Software

Lotus' 123>

@LEVEL(Discussion of the Execuwriter text handling criteria, its
pro's and cons.
@LEVEL[Entering text
@LEVEL[On-screen formatting

Block Movement

External File Read/Write]

Are integrated packages significant?)

Are there alternatives to single source multi-use software.)

@BEGIN(VERSE)
Can any one company extend its concentration beyond the
traditional single software offering and still produce viable software?

One or two aspects of each package may be viable.
Is it likely that all are?
@END(VERSE)
```

Figure 1: *A raw* Execu/WRITER *document showing the ''at'' sign (@) command lead character, and three of the many format macro options.*

```
                    Topics of Discussion

  -  System One Plus
       *  Execuwriter
       *  Execumodeler
       *  Execufile
  -  Supercalc 3
  -  Visicalc 4
  -  IT Software
  -  Lotus' 123

1.  Discussion of the Execuwriter text handling criteria, its pro's and
cons.

     1.1.  Entering text

          1.1.1.  On-screen formatting

          1.1.2.  Block Movement

          1.1.3.  External File Read/Write

     1.2.  Are integrated packages significant?

2.  Are there alternatives to single source multi-use software.


   Can any one company extend its concentration beyond the
   traditional single software offering and still produce
     viable software?
   One or two aspects of each package may be viable.
   Is it likely that all are?
```

Figure 2: *A processed version of the document shown in Figure 1. The second line of the last paragraph should have been indented as the third one is. Two attempts to do so failed. Note the outline format achieved with delimiters and assignment macros.*

parentheses ( ). These delimiters can be used with the macro-commands to produce the formatted report in Figure 2.

> Execu/WRITER is a programmer's tool as opposed to a writing implement.

Printing is not accomplished directly from the editing mode; rather, the text is read by the Formatter, which analyzes it for possible errors and then either outputs it to the printer or stores it on diskette for future use. Providing that page breaks have been added to the end of each document, documents can be batch-printed.

The unfortunate part of this arrangement is that Execu/WRITER merits the status of a text handler rather than a word processor. Preparing documents involves a substantial amount of work, including mastery of more than just a few environment commands. Execu/WRITER is a programmer's tool as opposed to a writing implement, the chisel and stone rather than the pen and paper. Effective as it is, I wouldn't want to use it more than twice a day.

A Modest Proposal

Heretical as it may sound in light of recent trends in product design, I believe that integrated software from a single producer might well be less preferable than the integration of software companies. Were this to happen, we would have the best of all offerings on the market. Grafting *1-2-3*'s excellent treatment of numeric modeling to *WordStar*, standard that it is, and combining the result with *dBASE II*'s data management facilities and whatever emerges as the reigning graphics package would provide an integrated environment no one company could possibly match. It would certainly make more sense than expecting any software manufacturer to sustain excellence across such a wide variety of applications. ■

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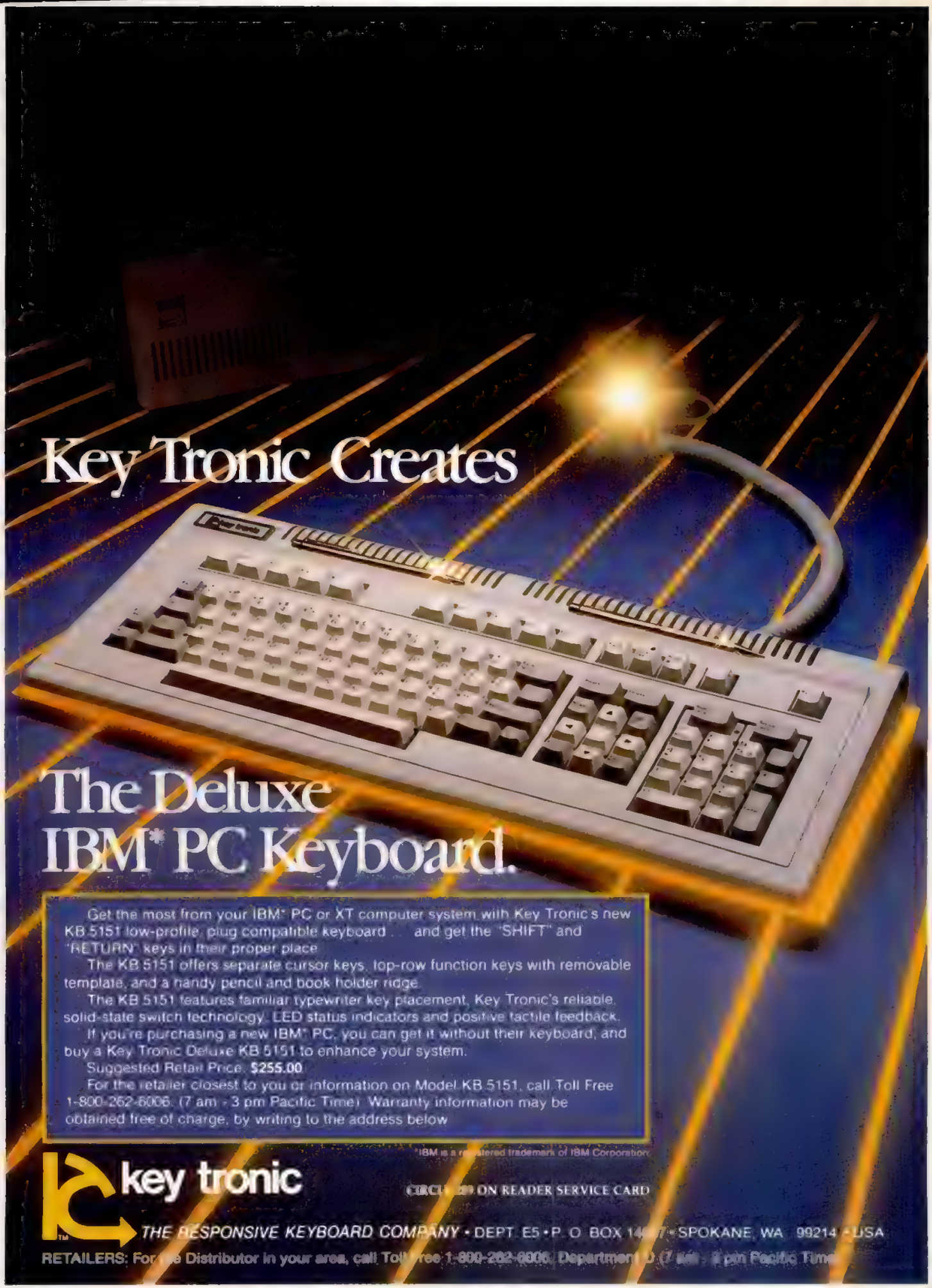
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Getting a Grip on Graphics

Here's a general look at graphics and a specific look at the graphics modules in VisiCalc IV, 1-2-3, and SuperCalc^3.

An integrated package should be just that: integrated. The basic functions—spreadsheet, database management, graphics, and word processing—should be included in the basic price. Each module should be able to communicate with the other modules and moving between them should be as simple as issuing a command.

Of the five software packages reviewed in this issue, only three include fully integrated graphics modules as part of their basic packages: *SuperCalc^3*, *VisiCalc IV*, and *1-2-3*. I will take a look at the various kinds of graphs, the necessary terminology, and the actual process of creating a graph before examining each program.

Types of Charts

Charts come in many sizes and shapes. One of the most popular forms is the pie chart, which analyzes one complete group of related numbers and depicts them as pie wedges. The size and position of each pie chart wedge enables a viewer to immediately grasp its relationship to the other parts and to the pie.



Another common type is the bar chart. It examines two or more groups of values represented by rectangular blocks of relative length or height. The first numbers in each group are converted into bars that are clustered together for comparison. The second numbers form another cluster, and so forth. The relationships among the numbers in each of these clusters and those from cluster to cluster are immediately apparent.

Stacked bar charts, which compare two or more groups of numbers, have a more complex format. The first value from the first group is represented by a rectangle of a given height. Stacked on top of the first rectangle is a second one of a different color or pattern, which represents the first value from the second group. The combined height of the first stack of rectangles represents a total in the same way that the combined wedges of a pie chart complete the pie. Two or more of these stacks may be included across a single chart, making it possible to grasp relationships between individual quantities or sets of quantities at the same time.

Other Types of Graphs

Another form is the line chart, which is used to emphasize change. Here, one or more groups of numbers represent measurements made at constant intervals over

a period of time. These measured values become a series of points placed at vertical distances above a baseline. The points are connected sequentially by horizontal line segments. The degree of change from point to point is reflected in the incline or decline of each line segment. Several sets of lines can be combined on a single chart.

A chart called the high/low graph generally depicts daily market performance of securities or commodities using two, three, or four related groups of numbers, depending on the software package. It could include high, low, opening, and closing numbers for each day of a given week. This type of chart plots a timeline on which each set of numbers is represented by a single vertical line that joins high and low values for the day. You may also find tick marks showing opening and closing figures on this line.

Another type, the x/y graph (sometimes called a scatter graph), does not graph numbers on a timeline but against one another. One group of numbers supplies the x coordinates; the other supplies the y coordinates. This kind of graph creates a picture of relationships in two dimensions where the combined importance of each x/y pair of numbers must be measured against all other pairs. Clustering and distribution are the significant factors here.

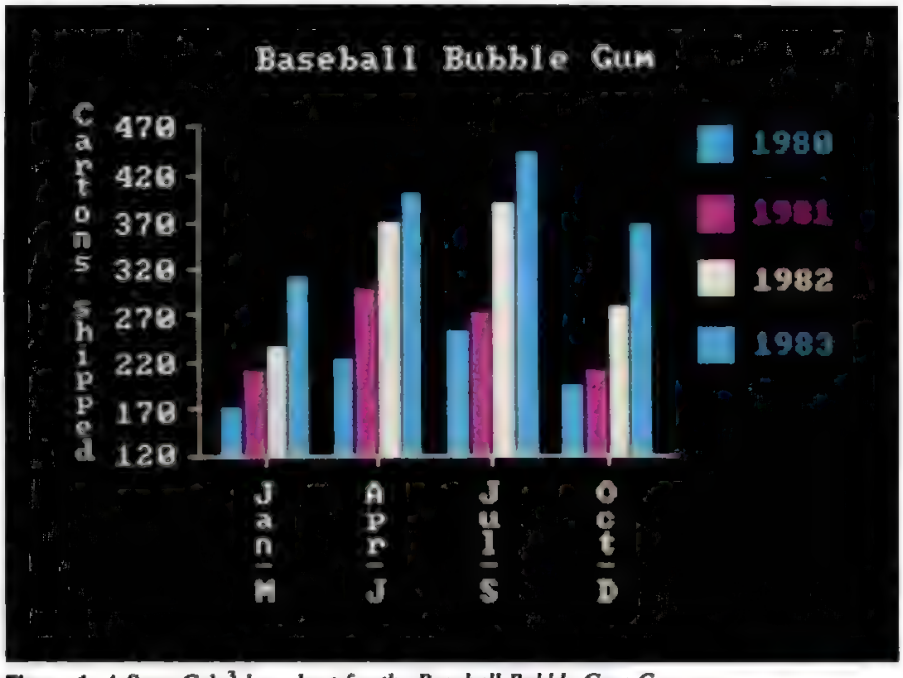


Figure 1: *A* SuperCalc[3] *bar chart for the Baseball Bubble Gum Company.*

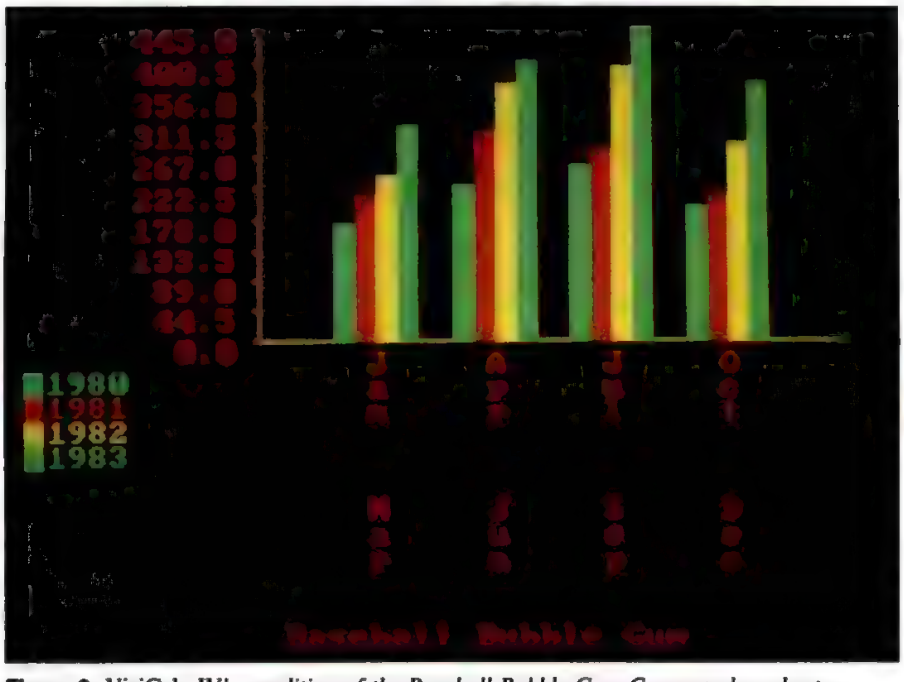


Figure 2: VisiCalc IV*'s rendition of the Baseball Bubble Gum Company bar chart.*

Graph Terms

Almost every kind of chart used in business graphics will fall into one of these categories. A number of terms are used when referring to charts or graphics.

- **Format.** All charts have a conventional format. Two axes define a rectangular area. Across the bottom runs the horizontal or x axis and up the left side runs the vertical or y axis.
- **Origin point.** The origin point is the lower left corner where the two axes intersect.
- **Axes.** Each axis is subdivided into regular segments indicated by tick marks and labels. The horizontal axis normally represents units of time, while the vertical axis measures values or amounts.
- **Labels.** Labels for the horizontal (x) axis can be automatically selected from column or row headings and copied directly to the chart.
- **Titles.** All graphs should have a main title to provide a context for the viewer; they may also have subtitles. For greater clarity, you may find it necessary to assign titles to the vertical and horizontal axes.
- **Legends.** When pie slices and bars are differentiated by color or pattern, it is important to identify what each area represents in a legend. In some cases, you

may assign legend names from column or row headings already entered on the spreadsheet. Other times you may want to generate legends of your own choosing.

• **Grid.** An important feature to some kinds of graphs is a grid of evenly placed vertical and/or horizontal lines that are extensions of the tick marks on the axes. A grid should only be used when it will make the individually plotted values easier to read.

Creating a Graph

I devised a sample bar graph for the Baseball Bubble Gum company and created it using each program. There are some general procedures for creating a graph that you should know before you can understand the differences among the individual programs.

After you have entered the information to be graphed into the spreadsheet module, you are ready to create a graph. Locate the groups of cells to be used in the graph and write down their coordinates. This information is usually a selected subset of the larger cell ranges. Next, make notes on the main title, subtitle, axes titles, legends, and labels.

Using the notes that you have assembled about your graph, enter the graphics option and begin to define the graph. First, select the type of graph to be generated. Next, define the groups of numbers to be used by entering the first and last cells of the block(s). Select a main title and subtitle and, if needed, enter x and y axes titles. Add labels to the x coordinate to identify individual tick marks across the bottom. Scaling might be necessary to make the vertical range consistent with other charts you are generating, so enter the scaling factor. If you want the scaling to be automatic, skip this entry.

Once the graph has been defined, you may want to view it on an RGB monitor. If you have any adjustments to the way it is defined, reenter the graphics option and make your changes.

When you are satisfied, you can do several things. You may need to save the graph for later viewing. This is usually done by attaching it to the spreadsheet in some manner and resaving it to disk. Remember that any graph you save with the spreadsheet is merely a set of instructions for generating the graph and will only reflect the values in the spreadsheet at the actual moment you save it.



If you are lucky enough to have a plotter, you can define different pen colors to be used for different elements of the graph.

Another possibility is to use the graph in the "what-if" mode, in which changes you make to the information used to generate the original graph are reflected in the graph while it is displayed on the color monitor. You must take special steps to save any "what-if" graphs that you need for later analysis. One good way to do so is to print them out as hard copy using a plotter or dot matrix printer.

Printing a chart requires a second definition procedure to set up the parameters describing how the final printed version should look. Select type fonts for the titles and determine size and orientation (it is possible to generate a full 8½-by-11-inch page when the graph is rotated 90 degrees). If you are lucky enough to have a plotter, you can define different pen colors to be used for different elements of the graph. (If your plotter has only one or two pens, selecting too many colors means you have to swap in new colored pens when needed.)

You must follow a process like this no matter which of the three integrated packages you use, although each package has its own way of doing these things. To compare *1-2-3*, *SuperCalc*^{3}, and *VisiCalc IV*, I will repeat the steps for generating a graph and discuss details of the process unique to each.

Show and Tell

I defined a spreadsheet showing quarterly shipments of Baseball Bubble Gum cartons for the years 1980 through 1983. Naturally, shipment peaks during baseball season. Each year was better than the previous one. My chart will examine quarterly shipments side by side for the 4 years (see Figures 1, 2, 3, and 4).

The number of cartons shipped goes on the y axis. Along the x axis, I put all the first quarters for the 4 years clustered in a group labeled "first." The second, third, and fourth quarter clusters will follow.

For the example, I selected the bar chart procedure, although a line chart might have been just as effective.

After loading the Baseball Bubble Gum spreadsheet, I started generating the graph. All three programs use a similar system of commands, but *1-2-3*'s full-word menus gave me more confidence about where in the process I was at any moment. Command tree diagrams help, and all three provide them. I like the one in *VisiCalc IV* best, and *SuperCalc*^{3}'s Answercard 2 is handy, too.

After accessing the graphics menu, I selected the type of graph I wanted to use, which in this case was a bar. Next, I

selected the data to be graphed.

With *VisiCalc IV* I was immediately asked to enter the range. I delimited a block of cells using row and column letter/number designations. I was asked whether I wanted rows or columns across the bottom of the screen. I selected R (for row) and the graph was immediately generated using black-and-white cross-hatching on the RGB monitor.

1-2-3 offered less guidance; it assumed that I knew what had to be done. While *VisiCalc IV* only accepted information described by one block of cells, *1-2-3* required me to individually define each group of values, up to a maximum of six. Although it offered more freedom than the others, it allowed me to accidentally assign two rows of figures to one group, which produced a puzzling bar graph.

SuperCalc^3 straddles the fence. It allowed me to define a block of cells or several individual groups. This approach is probably the most useful.

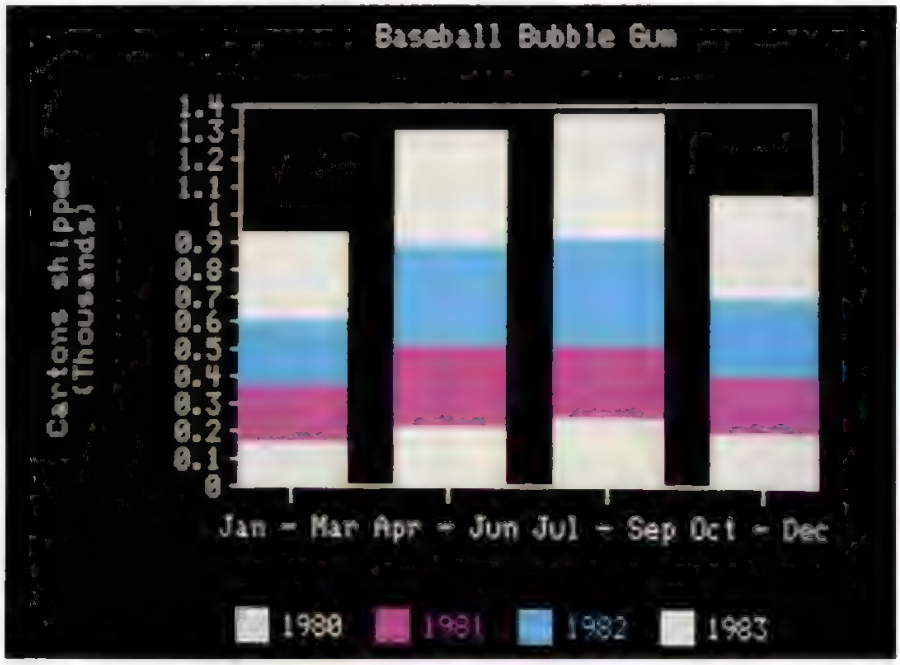


Figure 3: *The Baseball Bubble Gum Company bar chart as* 1-2-3 *draws it.*

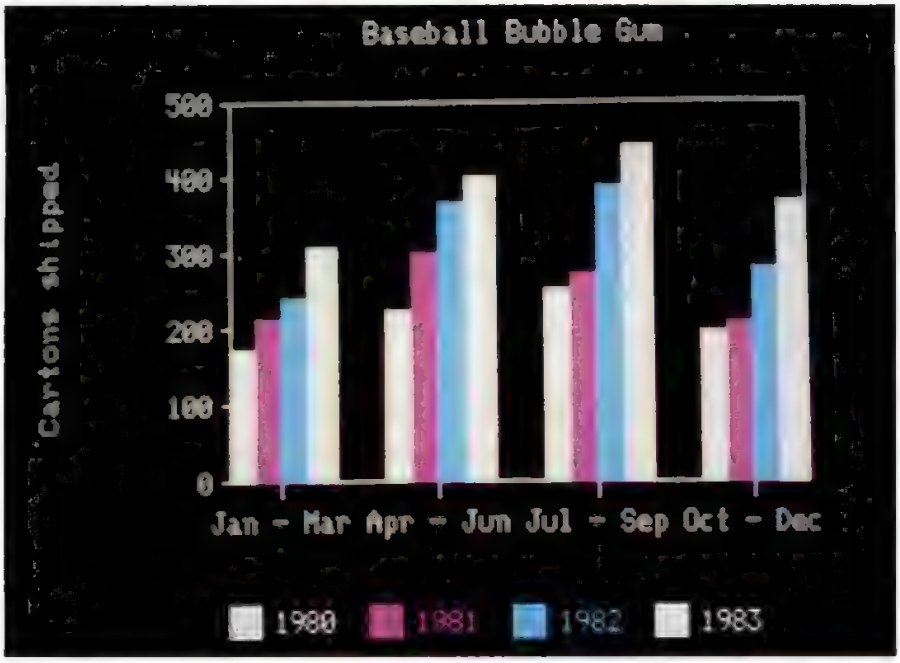


Figure 4: 1-2-3*'s stacked bar graph for the Baseball Bubble Gum Company.*

> Before you leave 1-2-3, you must save both the spreadsheet and the graphs you are printing to the disk.

Another important aspect is titles. *VisiCalc IV* handles them in a straightforward way: Whatever appears in cell A1 is displayed as the main title—no exceptions, no subtitle, and no x axis or y axis titles, either.

The other two programs realize that these additional titles are necessary for more sophisticated graphs. *1-2-3* lets you enter the titles directly on command while *SuperCalc*^{3} makes you first enter the titles in spreadsheet cells and then point to them by entering the cell names. This procedure entails moving out of the graphics menu each time you want to adjust any of the titles, which means you have to plan carefully.

You can insert labels across the x axis in all three programs: *VisiCalc IV* simply takes what you have across row 1 or down column 1, assumes that these are the labels, and puts them across the bottom of the screen with the labels reading vertically.

SuperCalc^3 permits you to assign the row or column block to use as labels. *1-2-3* lets you assign labels by using the x data range on the main graphics menu, but it also lets you enter labels directly.

VisiCalc IV assigns legends from your first spreadsheet row or column, whichev-

er you didn't use for the labels. *SuperCalc³* takes legends from a designated cell block, either rows or columns, using what was entered into the spreadsheet before. *1-2-3* lets you directly enter the legend or assign the contents of an individual cell.

As a final step before generating the bar graph, the options command in all three programs allows you to choose color or black and white, to decide whether or not a grid is to be overlaid, to define the scale manually, and to choose other parameters to configure the resulting graph.

SuperCalc³ generates the graph as described when you leave the graphics menu. Once the graph appears on screen, it is immediately updated whenever you make changes in the spreadsheet data, which means that the screen immediately reflects the data relationships in your graph—an impressive feature.

1-2-3 generates the graph when you enter the view command under the graphics menu or when you press F10 at the command level. Unlike *SuperCalc³*, *1-2-3* only updates changes in the graph when you press F10, even though one or more modifications have been made in the spreadsheet model.

Getting It Down on Paper

Printing a hard copy of the spreadsheets is a separate issue entirely. *VisiCalc IV* uses a simple screen dump technique to generate its hard copy of the graph. What you see on the screen (if it's black and white) is what you get on the paper. At first I thought that method was inadequate, especially when compared with the slick printouts the other two programs create, but the bold look of the final *VisiCalc IV* printout is more than satisfactory for most presentations. *VisiCalc IV* is by far the fastest of the three when printing out 8½-by-11 inch graphs on an MX-80 printer.

SuperCalc³ prints out the currently displayed graph when you press the F9 key. You should first select a font style from the global graphics menu, which offers four fonts, each in two faces. When you do press F9, be prepared to wait 8 minutes per page while the printout is generated. And you can't preselect a series of graphs to be printed.

With *1-2-3* you can queue a series of graphs and let them run. However, any graphs printed with *1-2-3* are generated by a whole separate utility program, PrintGraph. Before you leave *1-2-3*, you must be sure to save both the spreadsheet and the graphs you are printing to the disk. You create a separate print instruction file for each graph. When you transfer to PrintGraph (on another disk), you first are asked to select the graph(s) to print. At this point, you queue up a series of graphs so that you can dump them all at once. This queuing is essential, since seven graphs might take an hour to print. PrintGraph offers exactly the same font selections as *SuperCalc³*. You then enter options including orientation and full-page output, and select the "go" option.



All three products fall down when it comes to color quality on the RGB display. When a program displays three colors against black, it simply isn't trying hard enough.

A Few Nits

I do want to mention a few other points about these programs.

One warning about *VisiCalc IV:* If you are not using an RGB monitor but *VisiCalc IV* thinks you are, your spreadsheet information could be damaged. I don't know why this is so. The other two programs check whether the color card is present.

If you are using both monitors with *1-2-3*, you must install a set of drivers using the BOTH.BAT file. This point is mentioned in the manual.

All three products fall down when it comes to color quality on the RGB display. In spite of the limitations of the PC's medium-resolution palettes, a program is not trying hard enough when it simply displays three colors against black. *SuperCalc³* and *1-2-3* use palette 0 (cyan, magenta, and white). *VisiCalc IV* uses palette 1 (green, red, and yellow). A great deal more could have been done with the mode and color registers in *SuperCalc³*, *VisiCalc IV*, and *1-2-3*.

And the Winner Is . . .

All three integrated packages offer more than adequate graphics capabilities. *VisiCalc IV* relies on simplicity and speed, and its graphs could be used in most circumstances.

SuperCalc³ has more flexibility and allows for more sophisticated graphs. Since printing is integral to the *SuperCalc³* graphics program, I can get a printout whenever I want it. Although *1-2-3*'s pie charts are pretty lame, in general both *SuperCalc³*'s and *1-2-3*'s printed graphs are of excellent quality—well designed and elegant.

If I were to take home one of these three packages for my own use, I would select *1-2-3*. ■

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The network employs the industry-standard high speed Ethernet protocol, which permits a number of IBM PC's to be linked together by ordinary thin coaxial cable. In addition to his own computer's power, a user has the availability of other devices which are also attached to the cable - such as various printers, large disks, etc.

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SECRETARY $1695[1]
- Ethernet Link
- Ethernet Companion
- ELAN Software



EXECUTIVE $2995[1]
- Ethernet Link
- Ethernet Companion
- Modem (300 Baud)[2]
- Voice Recognition
- Microphone
- ELAN Software



[1]With 1st MATE, 2nd MATE, or 3rd MATE in Station
[2]Option: 1200 Baud Modem
*ELAN (formerly ComNet)

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- Ethernet Link
- Ethernet Companion
- Modem (300 Baud)[2]
- ELAN Software

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COVER STORY

Standing Up To 1-2-3

Lotus planted a winner with 1-2-3, but other contenders keep emerging. Some are as familiar as petunias; others are brave new hybrids searching for a place in the sun.



SuperCalc 3 Grows on You



With SuperCalc, Sorcim planted the seed of a fine spreadsheet. SuperCalc^3, the updated version, is now a match for 1-2-3.

Those with gambling instincts might view the competition for first place in the spreadsheet market as a real horse race. After *VisiCalc*'s initial success, software manufacturers scrambled to get their spreadsheet entries on the card. Among them was Sorcim Corporation, whose program *SuperCalc* was soon considered a major contender on the track. Then, in the fall of 1982, Lotus Development Corporation introduced its "integrated" software package, *1-2-3*. This program changed the rules and turned the spreadsheet race into a Triple Crown derby combining spreadsheets, database managers, and graphics into a single race. At first, *1-2-3* appeared to be an uncatchable frontrunner, but Sorcim rallied with the introduction of *SuperCalc*^{3}. Once again, the spreadsheet competition appears to be anybody's race.

This intense competitive pressure has accelerated the development of spreadsheets from basic two-dimensional columnar pads into *n*-dimensional formulas with fully-integrated graphics, data management, and text editing capabilities. Unfortunately, the rapid pace of development can intimidate computer owners who don't know the ropes. And serious users

who depend on their computers can't afford to wait until the race is over to see who wins. They have too much work to do today.

So now is as good a time as any to ask the dreaded question of whether the upstart *SuperCalc*^{3} can challenge the proven success of *1-2-3*. To answer that question, we'll need to look at both programs and examine their similarities as well as their differences.

The Learning Curve

Both *SuperCalc*^{3} and *1-2-3* offer option menus on a prompt line of the screen, making it relatively easy to enter a complex command series. However, their command trees have very different structures. *1-2-3* uses fewer primary commands at the top, but each command branch is longer. *SuperCalc*^{3}, on the other hand, starts with more than 20 command options, each represented by a letter of the alphabet. Once these commands are mastered, the options under each are very manageable. Both packages come with well-designed reference manuals.

1-2-3's on-line tutorial is excellent. In about 5 hours' time, it provides a good working knowledge of the package and shows some of the advantages of *1-2-3* over *SuperCalc* and *SuperCalc*^{3}.

SuperCalc^3 takes a slightly different approach. Its tutorial consists of nine lessons that are used with files provided on disk. In addition, it comes with a guide called *Ten Minutes to SuperCalc*, which is an excellent ice-breaker for the timid and a blessing for those who already know something about spreadsheets. You can print a graph within 10 minutes after opening the package!

SuperCalc^3 comes with two reference cards, one for graphics and one for all other commands. Their visual layout makes them easy to scan for quick answers to questions. This arrangement is faster than the more traditional text layout of *1-2-3*'s 12-page quick reference guide.

> You can print a graph within 10 minutes after opening the SuperCalc^3 package!

Entering Data

In both *1-2-3* and *SuperCalc*^{3}, the cursor is controlled with the arrow keys or with GOTO commands. Only *1-2-3*, however, makes full use of the PC keyboard's PgUp, PgDn, Home, and End keys, and life without them is indeed tedious. (Sorcim claims that newer versions of *SuperCalc*^{3} will support the use of these keys.)

In both *1-2-3* and *SuperCalc*^{3}, text entries are simply typed and then entered. Both programs treat numeric entries as text when preceded by double quotes. Both *1-2-3* and *SuperCalc*^{3} let you specify whether you want text to be displayed flush left or flush right, but only *1-2-3* can center text in a cell.

On the other hand, *1-2-3* lacks the "repeating text" function of *SuperCalc*^{3}. This function allows you to draw a horizontal line across the spreadsheet using just two keys. This eliminates the extra steps–required with *1-2-3*—of filling a single cell and then copying it all the way across the row.

Both packages can utilize both monochrome and color monitors. *1-2-3* requires the color monitor for graphics displays, but it does not use color meaningfully in the spreadsheet display. *SuperCalc*^{3} doesn't require a color monitor for graphics, but if you do have one, you'll see negative numeric values displayed in red in unprotected cells (violet in protected cells). Protected cells with nonnegative values are displayed in yellow, as are the borders, but unprotected cells with nonnegative values are white due to the limitations of the IBM color monitor.

SuperCalc^3 and *1-2-3* both contain all the built-in functions you'd expect in a top-notch spreadsheet, including arithmetic, logic, calendar, and financial functions.

Many commands operate the same way in both spreadsheets. Notably missing from *SuperCalc*^{3}, however, is the ability to move a range of cells. *SuperCalc*^{3} allows rows and columns to be moved only one at a time. Also missing from *SuperCalc*^{3} is the ability to name ranges so that they can be referred to with a single word rather than by a description of the range. And, while *SuperCalc*^{3} does a very good job at the printer, *1-2-3* offers more options, including the ability to place headers and footers.

Command Files and Macros

SuperCalc^3 takes a unique approach to macro creation, or what the *1-2-3* manual calls the "Typing Alternative." In *1-2-3*, predetermined keystrokes are assigned to simple key combinations, so that complex operations may be performed by simply pressing, for example, Alt-C. It's almost like having a built-in *Pro-Key* package.

SuperCalc^3, on the other hand, uses the /X command (execute) to activate an external command file. This is stored as text and consists of a series of keystrokes. It allows you to work across files. For example, you can build a command file that will load a file, print it, zap it, load a second file, print it, zap it, load a third file, and so forth. The "Typing Alternative" on *1-2-3* does not offer this ability to work across files.

***SuperCalc*^{3}**
Sorcim Corporation
2310 Lundy Ave.
San Jose, CA 95131
(408) 942-1727
List Price: $395
Requires: 96K RAM, two double-sided disk drives or hard disk, PC-DOS 1.1 or 2.0, 80-column display. Color/graphics adapter optional.

CIRCLE 797 ON READER SERVICE CARD

Space and Time

Two critical factors determine the size of a spreadsheet: the highest cell address (that is, the maximum number of rows and columns) and the highest number of cells you can enter before running out of memory.

On the first point, *1-2-3* has 2,048 rows and 256 columns, while the original version of *SuperCalc³* has just 254 rows and 63 columns.

Regarding the second point, a simple test can demonstrate the differences between the two packages. Running on an IBM PC with 192K RAM, the formula 3*3*3/4 was entered in cell A1, then replicated down column A, and, finally, column A was replicated across all columns. Both packages ran out of memory long before they completed this last command, but *SuperCalc³* was able to fill nearly twice as many cells as *1-2-3* was, before running out of memory.

Another curious difference between the programs was that blank cells within a matrix take up memory space in *1-2-3*, but not in *SuperCalc³*. This means you can work in the far reaches of the spreadsheet in *SuperCalc³* without wasting precious memory space storing blank cells.

Data Management

Data management is a perfect example of how users benefit from software competition. *SuperCalc²*, introduced in April of 1983, offered the useful, but fairly limited, /A (arrange) command, which simply allowed you to sort the rows or columns in ascending or descending order. *SuperCalc³*, however, offers data management capabilities sophisticated enough to challenge *1-2-3*'s. Its data management command operation is virtually identical to *1-2-3*'s. You can define the input range, the output area, and the criterion range, and then copy data from the input range to the output area selectively. The commands in *SuperCalc³* are far easier to use than the relatively complex data management commands that *1-2-3* requires.

SuperCalc³ was able to fill nearly twice as many cells as 1-2-3 was, before running out of memory.

SuperCalc³ does not offer a command to create data tables, a very useful feature of *1-2-3*. This command allows you to extract summary figures by category.

Graphics

Sorcim added graphics capabilities to *SuperCalc³* in direct response to *1-2-3*'s well-advertised graphics functions, so now both packages build bar charts, pie charts, line graphs (see Figures 1, 2, and 3) and high-low graphs. The graphics area, however, contained the most significant differences between the two packages.

Sorcim has done an outstanding job of fully integrating sophisticated graphics capabilities into its command structure. *SuperCalc³* does not require a separate program or disk to print out graphs, as *1-2-3* does. Further, graphics options are available on the appropriate commands elsewhere. You can, for example, view a directory of all your spreadsheet files and of the graphs attached to each. The /B (blankout), /C (copy), /L (load), /O (output), /S (save) and /X (execute) commands all contain graph options. Best of all, graphs can be viewed or printed at any time with a single keystroke.

With *1-2-3*, you can print graphics in black and white on a dot matrix printer or in color on a plotter, but you must have a color monitor to preview the graphics. With *SuperCalc³*, you can preview the graphics on a monochrome or on a color screen. You don't need to change disks, exit the spreadsheet, or save the graph specifications before printing the graph. You can reprint the last graph by pressing a single key.

SuperCalc³ presents a wide range of graph specifications, such as outlining the colored sections of a graph in black, selecting up to 16 different colors, 8 different fonts for titles of labels, and the

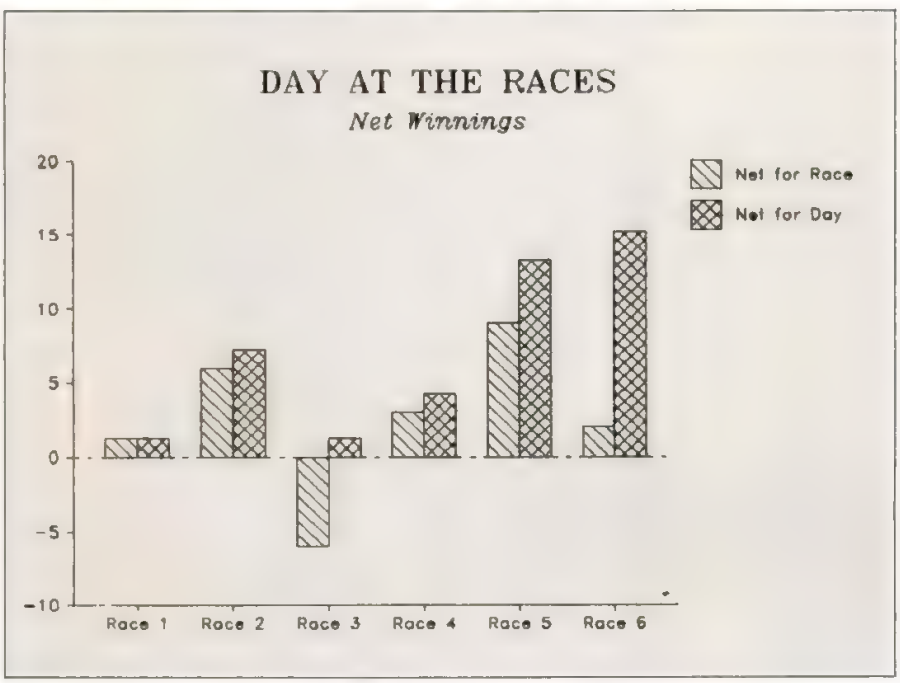


Figure 1: *A bar chart created by* SuperCalc³ *on an Epson FX-80 printer.*

ability to specify dimensions and location on the printed page. Full specifications for up to nine different graph formats can be saved within a single spreadsheet, and graph specifications can be invoked from one spreadsheet to another. Specifications can be viewed and changed on a full-screen submenu of options.

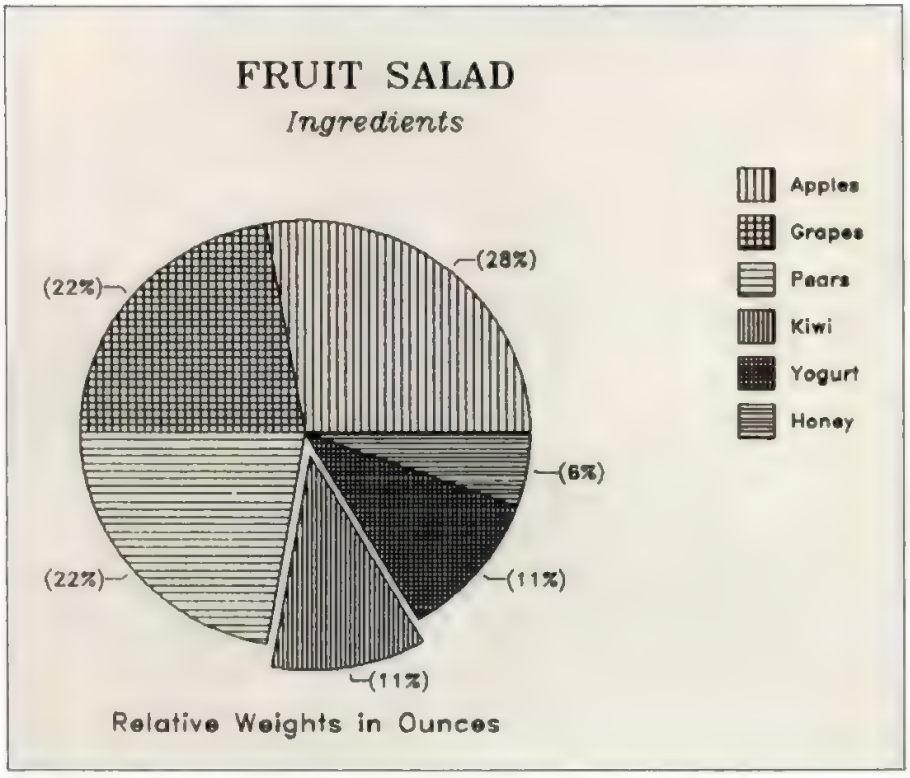


Figure 2: *A pie chart created by* SuperCalc^3*, also on an Epson FX-80 printer.*

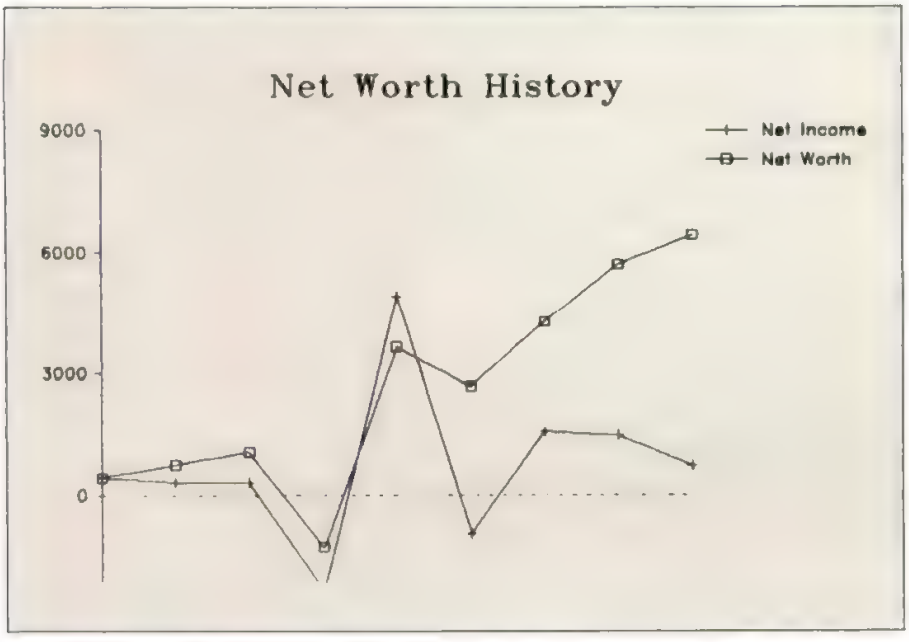


Figure 3: *A* SuperCalc^3 *line graph, printed on the same Epson FX-80 printer.*

In sum, the graphics functions of *SuperCalc*^{3} were easier to use, more flexible, and achieved a more attractive final presentation than those of *1-2-3*.

Ease of Use

1-2-3's screen prompts are full English words—less cryptic than some initial prompts on *SuperCalc*^{3}. Both packages have a series of help screens that can be displayed at any time to explain the current operation. *SuperCalc*^{3} also offers full-screen submenus showing all your option settings at a glance. This was very helpful in designing graphs. Generally, similar functions require fewer keystrokes with *SuperCalc*^{3} than with *1-2-3*, but the changing prompt lines make both fairly easy to use.

SuperCalc^3 offers full-screen submenus showing all your option settings at a glance.

The biggest drawback on *1-2-3* was the need for three copy-protected disks. You must change disks in order to print the graphics. *SuperCalc*^{3} comes on one disk, and graphics printing is part of the main spreadsheet menu.

The Choice

Change is the only sure thing in the fast-moving software development race. Given this fact, the only way to hedge your bets is to select software from manufacturers with a reputation for service and loyalty to their customers. Luckily, both Lotus and Sorcim are likely to bring their users along with them as they upgrade their packages. As for choosing between the programs, they're both powerful and swift, but *SuperCalc*^{3} has to be the favorite based on its ease of use coupled with the fact that it costs about $100 less than Lotus' *1-2-3*. ■

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VisiCalc: Still Blooming After All These Years



VisiCalc IV, the new integrated version of an old standby, rivals 1-2-3 for features and ease of use.

Once upon a time the most popular spreadsheet program from among the limited choices was *VisiCalc*, which was developed for the Apple computer. As other manufacturers moved into this arena, the spreadsheet wars began, saturating the market with VisiClones, most of which strongly resembled the original program.

Many of the clones tried to improve on some aspect of *VisiCalc*, but none, not even VisiCorp's own *VisiCalc: Advanced Version*, represented a giant leap forward. This giant leap was not possible until technology became more powerful. And when it did occur, it was not from the "calc-alikes" but from Lotus' *1-2-3*, which was designed for the then new and more powerful IBM PC. *1-2-3* made a huge dent in the *VisiCalc* users' wish list by improving the spreadsheet portion and integrating other major applications with it. The idea was that *1-2-3* would become the only program the professional would need.

In response to *1-2-3*, VisiCorp has now come to market with a competitive product: *VisiCalc IV* for the IBM PC. *VisiCalc IV* is the older version of *VisiCalc* with an add-on called *Stretchcalc* nicely integrated into the package. *Stretchcalc*, which was

originally written by Multisoft Corporation, adds graphics and data management tools to the original program.

Both *1-2-3* and *VisiCalc IV* are good examples of integrated systems. These programs contain a group of entirely different functions, all of which reside in the computer at the same time. Integration enables you, for instance, to create a spreadsheet, to graph the information in the spreadsheet, to sort it, query it, extract from it, and so on, without handling the disk or having to create DIF files to move the information between programs.

Both *1-2-3* and *VisiCalc IV* are terrific programs, but they have different features, advantages, and disadvantages. Let's compare the two feature by feature.

Integration

What is so impressive about *1-2-3* is that although integration is its most important feature, the individual elements more than hold their own against any competition.

VisiCalc IV does not seem as integrated as *1-2-3*. Although it behaves like an integrated system and gives you all the advantages of one, you cannot help but notice a difference between the spreadsheet portion of the system and the rest.

The spreadsheet portion, as we have already mentioned, is the original *VisiCalc* with its cryptic single letter command structure. The spreadsheet presents you with a familiar menu:

```
BCDEFGIMPRSTVW—*
```

The B, for instance, stands for Blank, C for Clear, D for Delete, and so on. The only new item to the experienced *VisiCalc* user is the asterisk (*), which is known as the Star Command. When you select this option you are immediately presented with a menu of the new features. These are Graph, Move, Keysaver, Adapters, Devices, and Options.

As you can see, the presentation is completely different. Instead of single letters, the commands are in English. This portion of the package is adapted from *Stretchcalc*. The method of integrating *Stretchcalc* with *VisiCalc* is simple and lovely. Nothing changes in *VisiCalc* except for the addition of the Star command. Once you key in the asterisk, you are using the *Stretchcalc* commands. These commands use the spreadsheet you have created in *VisiCalc* as if it were created especially for use in *Stretchcalc*. *VisiCalc IV* operates as if *VisiCalc* had always worked this way. When you select options from the various *VisiCalc IV* menus, a small arrow appears next to the option to indicate that you have selected it. This is a particularly useful feature for menus where you can select more than one option to perform a task because you can tell at a glance which combination is in force.

1-2-3's variety of functions, on the other hand, interact in such an integrated fashion that, after working with the system for a while, you tend to forget that you are performing different functions such as graphing, sorting, and extracting. These functions actually become part of manipulating a worksheet.

The Spreadsheet

Not even VisiCorp would claim that the spreadsheet portion of *VisiCalc IV* is superior or even comparable to the *1-2-3* spreadsheet. Lotus has compensated for almost every inadequacy of *VisiCalc* in *1-2-3*. For example, *1-2-3*'s spreadsheet has 256 columns and 2,048 rows, while *VisiCalc IV*'s has 63 columns and 254 rows. *1-2-3* has several features that *VisiCalc IV* lacks, including variable column width and the ability to handle percent signs, dollar signs, and commas with numerical values. *1-2-3*'s reports include page breaks, headers, and footers. Partial rows and columns can be moved. It calculates statistical functions including standard deviation and variance. Its financial functions include internal rate of return. Cells

VisiCalc IV
VisiCorp
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San Jose, CA 95134
(408) 946-9000
List Price: $250
Requires: 128K RAM, one double-sided disk drive.

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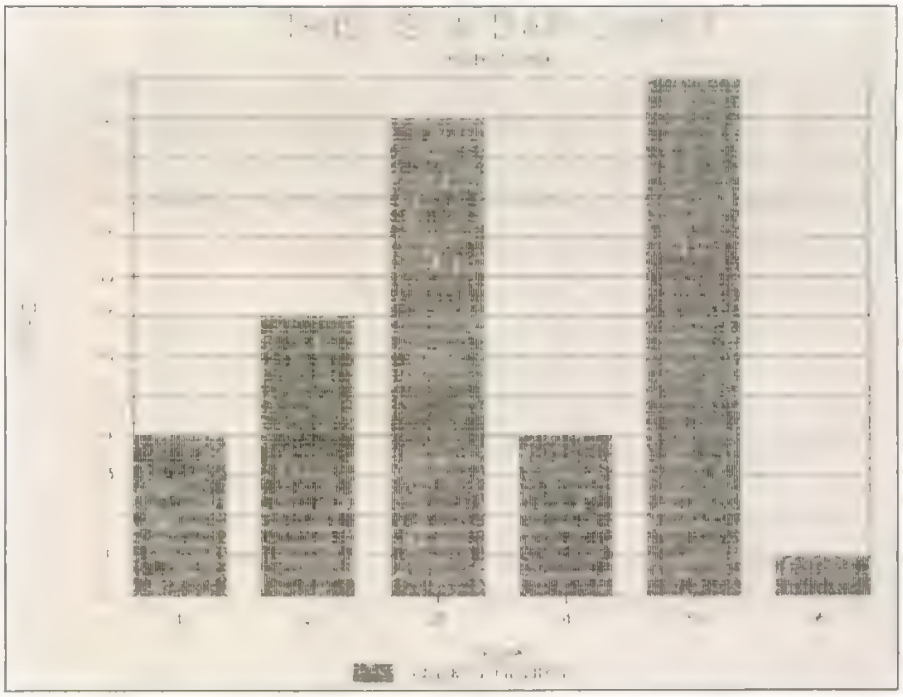


Figure 1: *A high-resolution chart produced by* 1-2-3.

and ranges can be named. The consolidation functions of combining, separating and transferring are built in. *1-2-3* performs calendar functions and date arithmetic. Keystroke memory (now available in *VisiCalc IV*) and information protection features allow you to make the spreadsheet part of a widely used clerical system. Nevertheless, the basic features of *1-2-3*'s spreadsheet strongly resemble *VisiCalc*'s so, although *1-2-3* is certainly not "as easy as 1-2-3" to learn, if you are already a *VisiCalc* user, the transition to *1-2-3* is not a difficult one.

Graphics

Both *VisiCalc IV* and *1-2-3* have superb graphics capabilities. We are truly unable to say that one system is superior to the other. Each has some features that the other lacks; we would like to see the two combined into one optimum integrated system.

You can store any of the graph images *1-2-3* creates in a graph file. You can then preview and print the graphs you have created (with an appropriate printer or plotter) using a graph utility program that is included in the system. You must exit *1-2-3* to use the utility. The graphics utility program permits high-resolution output, enlargements, reductions, rotation, and adding or changing of colors. (An example of the output is shown in Figure 1.) You can select any of eight fonts, print the graph to occupy a full page, half a page, or a location on the page you specify. You can print one graph after another without a pause. The graph utility can produce line graphs, bar charts (stacked or side-by-side), pie charts, and x-y graphs.

VisiCalc IV's graphic capabilities are less elaborate than *1-2-3*'s, but include a greater variety of graphs. Figures 2, 3, and 4 show samples of the various charts available in *VisiCalc IV*. The most obvious difference between these charts and those produced by *1-2-3* is the degree of resolution of the printed output.

VisiCalc IV's charts can look much more dramatic than *1-2-3*'s because you

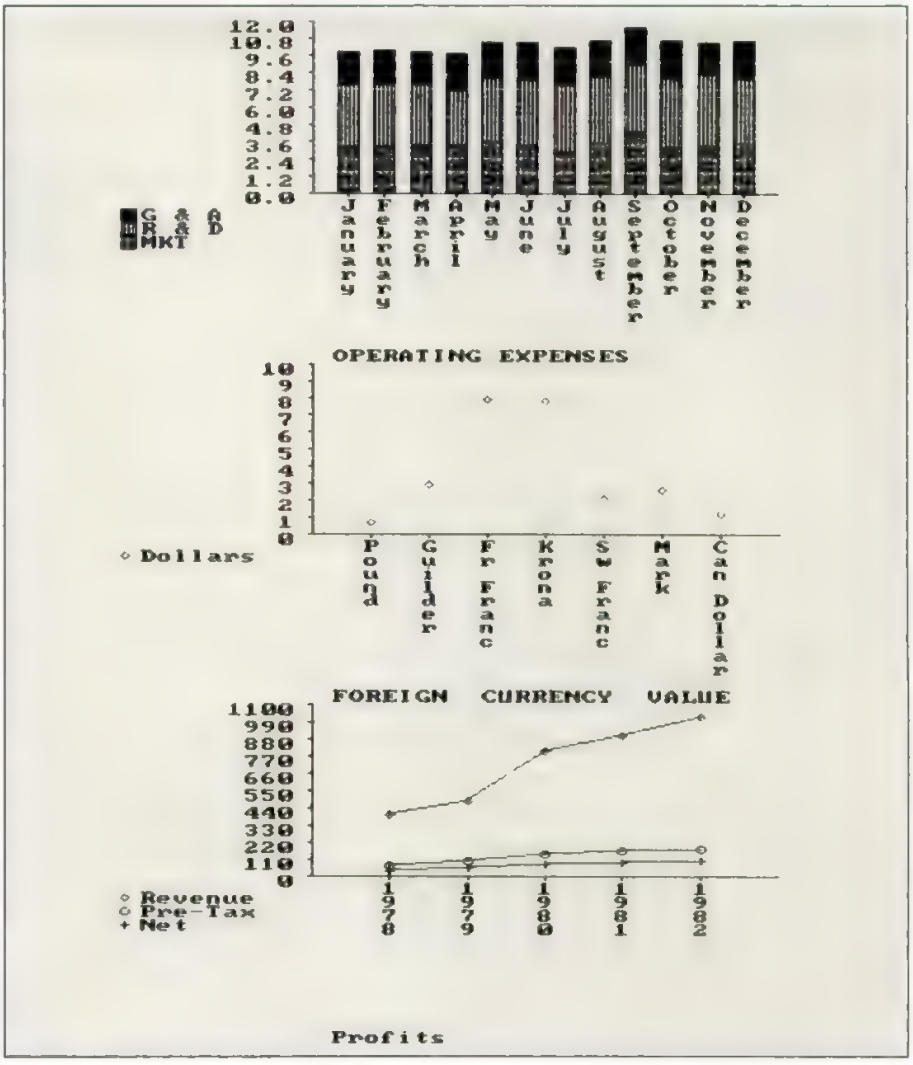


Figure 2: *Sample graphs from* VisiCalc IV.

can shade the area under the plotted line to create a solid picture. We miss this capability in *1-2-3*. *VisiCalc IV* has component bar charts (*1-2-3* calls these "stacked") and side-by-side bar charts, as well as line charts. *VisiCalc IV*'s dot graph plots points against a vertical axis as in a line or bar chart. Each point is marked by a small symbol, and the points are not connected. The graph's vertical axis consists of numbers and the horizontal axis consists of labels taken from the worksheet. *1-2-3* can also create this type of chart.

High-low-close charts are in great demand in both the professional and home markets. They are used primarily for reporting stock prices. A high-low-close graph plots values from three columns or three rows in the spreadsheet (one for the high values, one for the low values, and one for closing values) against a numerical vertical axis. Each of the three values is graphed as a vertical bar with a cross mark. The vertical bar connects the high and low values, and the cross mark represents the closing value.

A pie chart graphs the values of a single row or column as sectors, or slices, within a circle. Each slice is a percentage of the whole pie. Pie charts are most useful in comparing values to one another and to the sum of all the values.

Scatter graphs (called x-y charts in *1-2-3*) use only two rows or columns. They are two-dimensional in that the graph does not represent a group of single values as vertical distances (as in line, bar, and dot graphs) but represents pairs of values as the combination of a horizontal distance and a vertical distance. The horizontal axis is computed from the first row or column and the vertical axis from the second.

The differences between the two packages in the graphics area are quite obvious. With *VisiCalc IV*, you can print graphs in the main program, but in *1-2-3* you must store the image on disk, exit *1-2-3*, and load a utility to perform the printing. *VisiCalc IV*, however, lacks this ability to store images on disk. Because of these differences, *VisiCalc IV* seems to work with more immediacy: It performs all its functions with little fuss. With *1-2-3*, you have to follow more complex procedures. *VisiCalc IV* and *1-2-3* both offer varied database capabilities. Your database is your worksheet. Each cell is a field, each row is a record, and all the rows you have used make up a file.

Since the purpose of a database is to store and manipulate a lot of information, *1-2-3* has a real advantage over *VisiCalc IV*. This is because it has 256 variable-sized columns and 2,048 rows as opposed to 63 columns, that are all the same size and 254 rows. Thus in *1-2-3* your database can contain 2,047 records with 256 fields each, as opposed to *VisiCalc IV*'s 254 records with 63 fields each.

When you use *VisiCalc IV*'s database features, you get the feeling that the program was designed to be more of a quick analytic tool than *1-2-3*, which is complex and elegant. With *VisiCalc IV* you can rearrange the rows or columns in a worksheet; it moves columns to the left and rows to the top. You can move individual columns or rows, ranges of columns or rows, or combinations of these using the same command. With *1-2-3*, you can, in addition to these moves, move partial rows and columns and ranges of rows and columns anywhere on the spreadsheet.

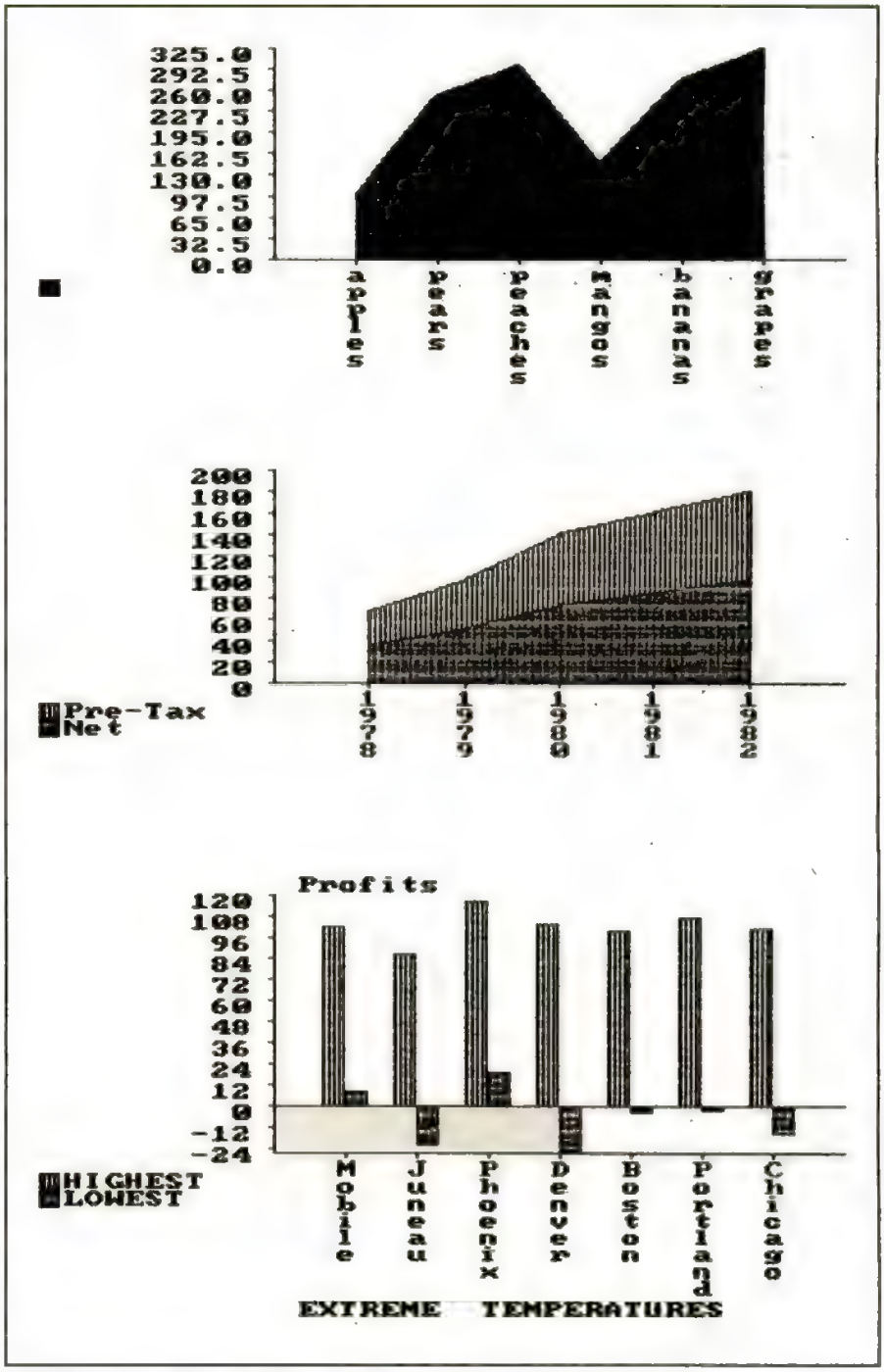


Figure 3: *Sample graphs from* VisiCalc IV.

Both systems have a marvelous and fast sorting feature, a valuable capability. *1-2-3* allows you to use both primary and secondary sorting criteria and highlights any range of rows or columns you select. *VisiCalc IV* allows you to undo any rearranging you may have done.

The Collect command in *VisiCalc IV* examines adjoining rows within a range, tests each to see if it meets your criteria,

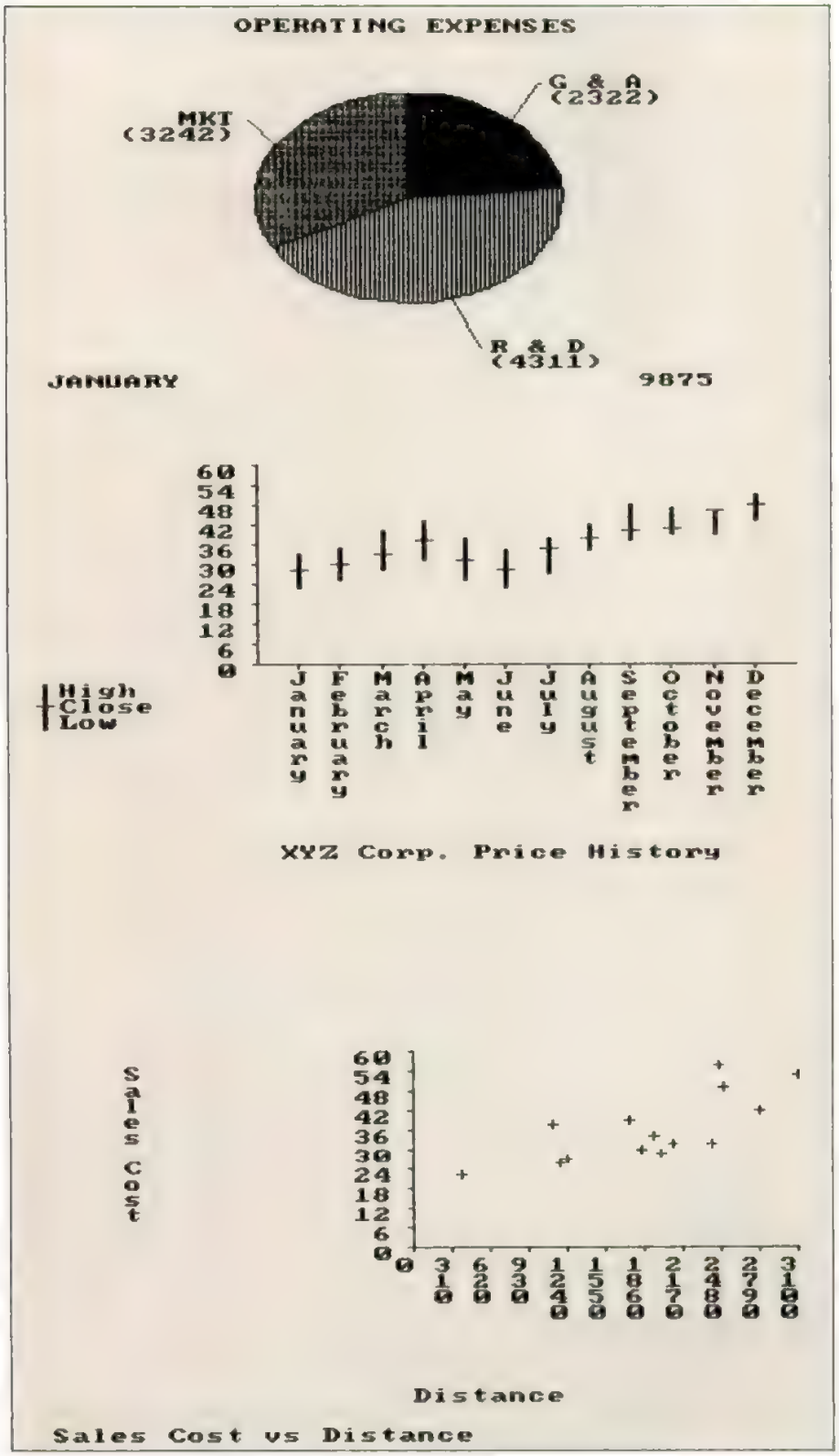


Figure 4: *Sample graphs from* VisiCalc IV.

and moves the rows that satisfy the test to the top of the collection or search range (you select the range). The system then tells you how many rows it has collected that fit the criteria and into which rows they have been moved. The data query command in *1-2-3* can be used in a similar way. It allows you to highlight rows that meet the criteria or to copy cells to another place on the spreadsheet. The database itself remains unchanged. You can use any selection criteria you can think of using valid *1-2-3* formulas and functions; they can use information from up to 32 fields in your database.

VisiCalc IV offers one more Star command worth discussing: the Keysaver command. A similar feature, called keyboard macros, is available in *1-2-3*. These features allow you to store and reuse a series of keystrokes, which you can recall with only one keystroke—a powerful capability in both systems.

Conclusion

Which is the product for you? If you are using the original version of *VisiCalc* and you are happy with it, but would like integrated graphics and data management along with keystroke memory, then *VisiCalc IV* is the product for you. If you are a registered *VisiCalc* owner you can upgrade to *VisiCalc IV* for $95. If you are dissatisfied with *VisiCalc*'s limitations (its spreadsheet size, its screen and/or report formats, and its lack of consolidation capabilities, statistical functions, calendar and date arithmetic, and variable column widths) or if you are a new spreadsheet user, then *1-2-3* is probably the system for you. It is certainly bigger and better than any program you will find on the market today.

Recent legal difficulties between VisiCorp, the publisher of this product, and Software Arts, the creator of *VisiCalc*, cast some doubt as to the future of *VisiCalc IV* as a marketable product. It will be unfortunate if *VisiCalc IV* does have to be taken off the market, as we find the system an attractive one. ■

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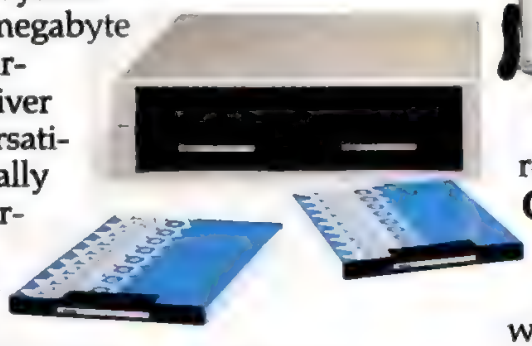
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Love IT or Leave IT



The IT Series family is a solid integrated package, although its methods are more traditional than 1-2-3's.

If there is any phrase that can rival "IBM compatibility" as a talisman in today's microcomputer marketplace, it is "software integration." At the moment, products that claim to offer software integration are in great demand. Ultimately these products will succeed or fail based on their practical value. The IT Series software family, a loosely linked group of flexible menu-driven programs from Martin Marietta Data Systems/ITSoftware cannot claim to represent the cutting edge of integrated software technology. For some users, though, the series could provide effective solutions to business requirements.

There are several types of software integration, and it is rare to find products that offer all of them. For example, users of Lotus' best-selling *1-2-3* can move rapidly from spreadsheet to data management or onscreen graphic functions after a few hours of practice. Working with *1-2-3* is simplified by the program's consistent menus that allow you to issue commands either by typing single letters or pointing with the cursor arrows.

For many users, the features that have made *1-2-3* so popular are valuable, if not essential. The IT Series offers little of this

sort of integration (although *EditIT*, a text editor that was not yet available for review, may come close by allowing the editing of multiple files through user-defined windows and cursor control from either the keyboard or a mouse). The IT programs do offer flexible data-integrating and transfer functions that permit the purchaser to preserve an investment in other software and—a feature that's especially useful for organizations with mainframes and minicomputers—share data with other users. The programs' designs are also based on the premise, which will probably prove correct, that a database manager is more appropriate than an electronic spreadsheet as the centerpiece of an integrated system.

> Most major functions are available from a single menu rather than a series of submenus.

In keeping with this philosophy, the centerpiece of the IT Series is *KeepIT*, a program that is advertised as a relational database manager. Some might quibble with this claim on technical grounds, particularly since *KeepIT* is primarily designed for managing single files. But *KeepIT* does have many of the same features as popular relational data managers like *dBASE II*, combined with the simplicity of filing systems like Ashton-Tate's *Friday!* or the *pfs* series.

KeepIT's Noble Roots

KeepIT is a program with noble and powerful ancestry in the world of data management. Its developers were associated with Mathematica, the producers of the *Ramis II* mainframe database mangement program. When Mathematica was acquired by Martin Marietta, the giant aerospace firm made ITSoftware the new division's microcomputer products group. The overall seriousness and quality of the IT Series reflect this heritage. *KeepIT* may lack some of the flair that more recent software technology brings to the Apple Lisa or to *1-2-3*, but it is solidly grounded in the mainstream of traditional data processing. It is thus well suited to the requirements of certain large- and medium-sized organizations. The ideal target for *KeepIT* is a firm requiring software that can fulfill clerical as well as professional or managerial functions and that can exchange data with larger computers. Like most of the programs in the IT Series—some developed in-house and some acquired from other sources—*KeepIT* is menu-driven and requires little or no technical knowledge for basic operation. At the same time, it has features that can be used by a data processing department, software dealer, or consultant to automate some portions of data management tasks.

A first-time *KeepIT* user will probably be intimidated by the wealth—not to say clutter—of functions presented in the master menu, which appears every time

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CIRCLE 677 ON READER SERVICE CARD

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List Price: $500
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LinkIT
List Price: $150 (for VM/CMS mainframe, $1,495)
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Requires: 64K RAM, one disk drive.
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the program is run unless you use a specially created command file. Whereas *Friday!*'s main menu offers only four options (adding or retrieving data, other activities, and quitting), *KeepIT* presents a total of 29. Each one is selected with a two-letter command; this requirement initially seems annoying, but over the long run it probably helps to reduce erroneous selections. Compared to *WordStar*'s cryptic two-character command combinations, *KeepIT*'s DF command to define a file or CI to write out data to the *CalcIT* spreadsheet program are models of clarity. Most major functions are available from a single menu rather than a series of submenus, which helps speed up processing for experienced users.

KeepIT has no clever tutorial programs or cassette tapes, but the back of the manual contains a section entitled "Primer." This section includes good tips on planning new data files before actually using the program and presents a concise overview of *KeepIT*'s major functions and how to use them. An example demonstrates how to create and maintain a file of charity donors, from laying out initial field specifications and screens to printing reports and labels to passing data to other programs. Most casual users will learn as much as they need to about *KeepIT* within 75 pages.

Keeping Up with KeepIT

KeepIT's strengths lie in allowing you to set up several types of validation for data entries and in its many options for formatting reports—more than *dBASE II*'s or *1-2-3*'s built-in report generators or print format options offer. *KeepIT* also allows you to "paint" a data entry screen and set up field specifications a bit more easily, though less flexibly, than the Quickcode utility for *dBASE II* from Fox and Geller. Once you have specified a report or other output format, *KeepIT* allows you to "catalog" the setup for future use. Up to 85 formats and routines of each of several different types can be maintained. You can also create command files to automate various tasks by capturing the keystrokes required to perform them. This helps to overcome the problems of speedy access to routine operations normally inherent in a menu-driven system. While it is less elegant than a *dBASE II* command file or the keyboard macro and custom menu segment of a *1-2-3* spreadsheet, the keystroke capture technique can be a good alternative for people who sincerely do not want to learn how to program.



KeepIT's valiant attempt to communicate with the rest of the micro and mainframe world is refreshing and inspirational.

KeepIT's main claim to integration is its ability to import data from and export processed information to a wide variety of other programs, most of which are not products of ITSoftware. There are at least 30 interfaces; in any competition for compatibility *KeepIT* would win hands down. Do you need to read in data from fixed-length records on a mainframe or comma-delimited ones from a BASIC sequential file? No problem. These, along with VisiCorp's DIF and Microsoft's SLK formats can be selected right from *KeepIT*'s Read Data menu. Once you have specified record lengths and the number of records to be read, you can, if appropriate, catalog this interface for future use—a great advantage for people who really do need to move data from one program or system to another on a regular basis.

KeepIT's ability to export data files in other formats is even more complete. Most of the popular spreadsheets, graphics packages, and word processors that are capable of accepting "foreign" data at all can probably be made compatible with *KeepIT* operations, though the interfacing capacity may not be as simple or complete as with other members of the IT Series. It is understandable that unlike *1-2-3*, *KeepIT* has no provision for converting the widely used *dBASE II* DBF files, though *dBASE II* itself can create *KeepIT*-compatible system data format files. But one serious gap in the chain of interfaces is the lack of direct capacity to read or write *1-2-3*'s WKS worksheets. A conversion to or from DIF format must be made by the *1-2-3* data transfer facility. All in all, though, people who bemoan the absence of standard data formats will find *KeepIT*'s valiant attempt to communicate with the rest of the micro and mainframe world refreshing and inspirational.

Other IT Programs

Only half the members of the announced IT family were available in time for this review, so I had no chance to test the word processing, text editing, or statistical programs. The word processing program, *WritIT*, is a private-label version of *MultiMate*; *StatIT* is a relabeled version of *MathStat* from Mathematica.

Among the available IT programs, *SortIT* stands out as a fast and versatile utility. Its basic functions appear to be integrated into *KeepIT*, so if all you need to sort are your *KeepIT* files, you probably don't need to buy *SortIT* separately. *SortIT* supports most common data types and allows up to nine fields to be simultaneously sorted in ascending or descending order. *SortIT* can be called from other programs and used as a subroutine in BASIC, and its output can be directed to another

disk file, to a printer, or to the screen. Although I did not test it on very long data files, *SortIT*'s performance seems to support the publisher's claim that it is the fastest sorting utility available for the PC.

The other three currently available programs are *LinkIT*, a smart terminal program; *PassIT*, a bisynchronous or SNA file transfer program using 3270 interface boards to communicate with mainframes; and *CalcIT*, a three-dimensional spreadsheet. All are competent products, but with fewer special features than *KeepIT* and *SortIT*. Such extras would give them major advantages over the competition.

When my *LinkIT* diskette arrived, it refused to load, which gave me a chance to test ITSoftware's offer of 1 hour of free support for each package. The technical staff already knew about our problem. They had had some difficulty with the settings on their disk copier and before they realized it had shipped a batch of faulty floppies. They were quick to make amends: They sent a new diskette that day by Federal Express. The new disk worked fine. *LinkIT* is a good match for any intelligent terminal program on the market. Corporate users should be quite willing to pay the $150 list price for *LinkIT* or $250 for *PassIt*, but individuals may be inclined to stick with public domain and freeware programs like *PC Talk*.

CalcIT is a well-documented spreadsheet package with several sample application templates, built-in plotting for bar charts and other simple graphs, and most of the features you would expect from an advanced $400 spreadsheet. It has direct data transfer facilities that work with *KeepIT* and an EXEC command file capability that makes it at least as programmable as *1-2-3* and more so than *KeepIT* itself. Its most unusual feature is its "data cube" model, which allows you to store and refer to cells by page as well as by row and column and examine data from any of the three perspectives. You can create summary reports by consolidating information that appears on several separate pages of a worksheet; each page allows up to 255 rows by 255 columns. For people who prefer this booklike mode of data representation, *CalcIT* can be a very powerful tool. Unfortunately, the program has a feature that could prove a fatal flaw for users accustomed to programs like *WordStar* and *dBASE II*. If you press Ctrl-Q, you are unceremoniously and without any warning dumped back into DOS. Even though this is a documented, official way of leaving *CalcIT*, it is totally unacceptable in a spreadsheet program, which relies on the user's saving the data to disk before exiting.



Martin Marietta is carving out a niche serving organizatons that honor traditional data processing procedures.

With the exception of this serious design problem in *CalcIT*, the IT programs are reliable and effective. I tested several modules on a Compaq and an Eagle Spirit XL hard-disk portable (a hard disk is a virtual requirement for using *KeepIT* and *CalcIT* to full advantage) and found no compatibility problems.

Who Needs IT?

If you're interested in the latest software magic, if you need Lotus-like speed in moving from spreadsheet functions to simple sorts and queries on a couple of thousand records, or if you want to play "what-if" games with figures and see them instantly graphed in living color by hitting a single key, the IT Series is probably not for you. But if your main problem is maintaining medium-to-large data files such as mailing lists or personnel records and you don't need or can't afford a customized system using *dBASE II*-style programming or keyboard macros, you should take a look at *KeepIT*. The rest of the IT Series may be less distinctive unless you really need to have three-dimensional spreadsheet capability. But ITSoftware clearly intends to provide strong support for organizations that require good data communications, especially links between a mainframe database and personal computers. The people at Martin Marietta have been generous in providing support for the users of products from other publishers.

Overall, the IT Series is a family of good, and in some cases exceptionally good, standalone modules with unusual data transfer capabilities. The manufacturer, Martin Marietta, is likely to survive the intense competition of the next couple of years by carving out a niche serving organizations that honor traditional data processing procedures and standards. At the same time, I wonder whether these programs aren't offering too little—or in some ways too much—too late. The IT Series is substantial in both size and price. Installing all the available modules would put a large dent in the data storage capacity of a PC-XT, and the retail price tag would be over $2,500. Though the cost of each module is reasonable, there doesn't seem to be enough real integration in command structures and data transfer to compel a *KeepIT* or *CalcIT* user to make other purchases strictly within the IT family.

The long-term future belongs to more tightly knit programs. The opportunities are shrinking quickly for even the best semi-integrated products, and a new software generation may be on the market before the still-incomplete IT family has had a sporting chance to prove its worth. ■

SeriesOnePlus Shows Its Tangled Roots



With its cumbersome design, SeriesOnePlus falls short of today's standards for integrated software packages.

Although Executec's *SeriesOnePlus* and Lotus' *1-2-3* hit the market at about the same time, they are a generation apart in design. *SeriesOnePlus* is an ambitious package that links sophisticated database management with a spreadsheet and a text processing program, but it lacks *1-2-3*'s integration of graphics and graceful simplicity. *SeriesOnePlus*' operation is awkward; it requires many disk changes and file conversions. And its individual programs don't have all the up-to-date features that make *1-2-3* easy to use.

Packaged as *The Business Analyst Series* in 1982, the software was first aimed at executives of large corporations. In September of last year, Executec renamed the package *SeriesOnePlus* and at the same time changed its marketing strategy to appeal to software distributors.

The *SeriesOnePlus* system consists of five independent programs connected through a primary menu program, which is called Execu/BUS. From this main menu, you can select Execu/WRITER (a text processor), Execu/FILE (records management), Execu/FILE (records definition), Execu/FILE (database extract), or

Execu/MODEL (the spreadsheet). Spreadsheet graphics are available only from a separately purchased package called Execu/PLOT. You can use files built through the spreadsheet program for database management and vice versa. Once you have converted these files for text processing, however, you can't transfer your edits back to the spreadsheet or data file formats.

Considering its numerous capabilities, it's not surprising that the full *SeriesOnePlus* system comes on five disks, plus a utilities disk. Using the package with a two-drive system requires a bothersome amount of disk handling, but hard-disk users can easily copy all the disks and never handle them again. *SeriesOnePlus* takes up so much disk space that it can't be used on a single-drive system.

The package also comes with a tutorial disk, a training manual, and a reference manual. The documentation is above average—we found the answers to most of our questions fairly quickly. The disk tutorial is easy to use and appears to offer a comprehensive overview.

Menu-Driven

To use *SeriesOnePlus*, you begin by loading the Execu/BUS master menu disk and typing the word BUS. When the system comes up, you must enter a user ID and password. The tutorial supplies entries you can make until you establish your own IDs and passwords. On the PC, this security feature will not prevent users with different passwords from looking at one another's files; it only prevents the use of the particular *SeriesOnePlus* program without the appropriate password. If you don't want to use this feature, you can turn it off with a utility program.

```
        Please enter each of the questions that are listed below.
        For each data field you specified in your 'drawing' file
        there will be one set of questions. Please RETURN after
        completing each set.

Field name: LAST NAME
Field number: 1
Field length:20

                Data Type:m
                Decimal Positions:0
                Graphic Data:n
                Required Data:n
                Screen Attributes:n
                Justification: 1
                Fill Character:
                Key Field:n
```

Figure 1: *Assigning field attributes is easy using* SeriesOnePlus' *menu format.*

Once you have logged on, the primary menu is displayed. It lists these options:

```
0. Display UTILITY Menu
1. Execu/WRITER
2. Execu/FILE-Record
Management
3. Execu/FILE-Record
Definition
4. Execu/FILE-Database
Extract
5. Execu/MODEL
E. Exit Execu/BUS
```

Making any of these selections (except Exit) requires that you replace the disk in drive A (Execu/BUS) with the one you have selected. Unfortunately, after you select option 1, for example, the program does not simply tell you to load disk 1 for Execu/WRITER. Instead, the bottom line displays: Selected Txt-Mnu Not Found at Location A.

Apparently, you are expected to remove the main menu disk and insert the Execu/WRITER disk before making your selection. We found the explanation in the 100-page alphabetical listing of error messages at the back of the reference manual.

The words used in some of the error messages and the awkward format of some of the commands unmistakably mark *SeriesOnePlus* with the archaic stigma of mainframe programming. Executives who have worked their way up through the mainframe days will barely notice these quirks. However, those new to computers may be confused by these messages.

To explore *SeriesOnePlus*' capabilities further, we built a data file, converted it to a spreadsheet, added totals, converted it to a text file, and included it in a report. We discovered that *SeriesOnePlus* could, indeed, handle all these functions—more smoothly in some respects than others. We found the package's system of menus generally helpful. But the BUS program is not as easy to use as other integrated programs such as *1-2-3*.

Database Management

Database management is the core of the *SeriesOnePlus* system. Its database capabilities are far more extensive than those offered by *1-2-3* and other, similar spreadsheet packages. Geared to meet executive demands, the package's data handling features are so comprehensive that they are shared by three separate programs. Each program comes on a disk of its own, and each is a separate selection from the main menu.

You use the Record Definition program to set up a new file (with a wide range of field attribute options), reorganize or reformat a file, print a file, or rename and delete whole files (disk maintenance).

SeriesOnePlus has more than its share of rules for defining the database. For

SeriesOnePlus
Executec Corporation
12200 Park Central Dr.
Dallas, TX 75251
(214) 239-8080
List Price: $495
Requires: 192K RAM, two disk drives.

CIRCLE 689 ON READER SERVICE CARD

example, the Record Definition program requires that each field label end with a colon followed by two blank spaces (where the field attribute information is stored but not displayed). Field names cannot start in column 1, and the "at" sign (@) is required before and after the title of the record form—novices will learn quickly by looking up error messages in the reference manual.

After you have "drawn" the record form on the screen, you must assign each field in the format various attributes; to do so you select the Generate a New File menu option. *SeriesOnePlus* informs you of all the mistakes you might have made in the form design phase. If you have made any, you must exit the Generate mode and return to the Definition mode through the Record Definition menu.

Once you iron out the problems with the form, you are ready to assign attributes to each field. Here, *SeriesOnePlus* offers a painless way to carry out what could be a trying task. You assign attributes to each field by selecting options from a menu of attributes (see Figure 1). This feature will be recognized as a blessing by anyone who has worked in a database system that does not offer such menu assistance.

Next, you can use the Records Management program (located on another disk) to add records to a file in your defined format or to retrieve records from a file.

Once you are in the Record Management program, it is easy to copy field entries (such as the date) from one record to the next. You may display, update, or delete retrieved records from the file. *SeriesOnePlus* lets you know when you are attempting to enter an invalid value in a field, which ensures that your data files are highly accurate.

The database extract program allows you to produce reports out of any *SeriesOnePlus* data file. To define these reports, you name source and target files, select fields for transfer, name up to eight fields as sorting keys, and specify criteria that records must meet to be extracted. The extracted report files can be printed out, used in the spreadsheet program, or converted to a text file.

The Spreadsheet

The Execu/MODEL program is the *SeriesOnePlus* spreadsheet. It is missing the graphing capabilities of the latest entries in the spreadsheet market, but it does have most of the built-in calculation functions you would look for in any spreadsheet. You can use the PC's cursor keys as the Return key to enter data and still direct cursor movement at the same time. But *SeriesOnePlus* does not work as well with the PC's keyboard as *1-2-3* does. For example, it does not respond to the PgUp and PgDn keys. Instead, two function keys are programmed to jump the cursor a full screen up or down on the spreadsheet. The label on the spreadsheet menu for these functions is confusing: the Up function means go down in the file, and Down means go up.

> The SeriesOnePlus system consists of five independent programs connected through a primary menu program.

We missed automatic onscreen display of the formula that is entered in the current cell—a feature we are accustomed to in *1-2-3*. In *SeriesOnePlus*, you have to press a function key to view cell formulas, which you can only see one at a time. Also, text entries are displayed only up to the width of the column where they are entered. This limitation makes entering report titles, for example, more difficult than it is in spreadsheets where titles can overflow into adjacent blank cells.

Text Processing

It's nice that Executec thought to include text processing in *SeriesOnePlus*. With *1-2-3* and other, similar packages, word processing programs must be purchased separately, and spreadsheet files may or may not be transferable to the word processing program.

But *SeriesOnePlus*' Execu/WRITER differs from many text processing packages in that it does not allow for immediate on-screen formatting. To center the title "Monthly Report," for example, you begin in column 1 of a blank line and type: @Center(Monthly Report). You do not see the title centered on the monitor screen, although it will be centered on the printout.

Execu/WRITER will be fine for you if your text processing needs are light and simple or if you will be using another text processor for your major work load. If you have never used a text processing program before, you will find Execu/WRITER's capabilities quite impressive. If you expect "what-you-see-is-what-you-get" word processing, you'll find Execu/WRITER awkward.

In all, we found the steps we took to produce a brief financial report with *SeriesOnePlus* were similar to those for converting any data or spreadsheet file to work with any text processing package. Although we were using one integrated package, we did not make any fewer disk changes; in fact, we may have made more. The needed file conversion steps were no fewer or faster than, say, converting *1-2-3* files to *WordStar*, or converting *dBASEII* files to *SuperCalc*. What "integrates" the *SeriesOnePlus*' five distinct functions is simply a series of connecting menus—a convenience, to be sure, but not the kind of integration we're looking for today.

The spreadsheet and integrated software market is now in a period of intense competition—new products and product enhancements are announced every week. In this environment, even though *SeriesOnePlus* meets the data management needs of any user, potential buyers may be lured away by the graphics, text editing features, and the relative ease-of-use of competing products. ■

The Metaphysics of METAFILE

METAFILE integrates database operations with text processing and math functions. It even offers menus and windows.

Sensor-Based Systems' software package, *METAFILE*, is aptly—indeed metaphorically—named. The name *METAFILE* consists of two parts: the Greek prefix *meta*, which means *between*, and the word *file*. Put these two words together and you get a good idea of what the system can do—move data and text between files. *METAFILE* is another of the integrated systems that has appeared on the market for the IBM PC within the past year and a half. It combines a good database with text processing, forms processing, menu generation, an excellent programming language, and some other interesting features. *METAFILE*'s strength is definitely its database system, but the other features are good, too.

METAFILE
Sensor-Based Systems, Inc.
1710 E. Lake Ave.
Glenview, IL 60025
(800) 323–3731; (312) 724–0310 (IL)
List Price: $995
Requires: 128K RAM; two double-sided, double-density disk drives.

CIRCLE 722 ON READER SERVICE CARD

To use *METAFILE*, you must have a PC with a monochrome or color display, at least 128K RAM, two storage drives, one of which must be a disk drive (the other can be a disk drive or a fixed disk), and a serial port with an RS-232 connector. Running under MS-DOS, the system software takes up 311K of storage in 20 files and the demonstration software uses 186K in 67 files. The package comes on two 320K floppy disks.

METAFILE's copy-protection scheme is unique. The program comes with a configuration device, in the form of a small black box, that attaches to the serial port of the PC. When the system is started without the box attached, *METAFILE* configures itself to a small demonstration version. It will still run, but with a much smaller capacity for text and data.

The Assistant

If you are up to speed with *METAFILE*'s commands and can create and manipulate databases and text files the way a concert pianist makes music, then all you have to do is enter commands and options on the command line, and *METAFILE* will do your bidding. On the other hand, if you are a beginner or have grown rusty, *METAFILE* provides you with the Assistant, a full prompting menu system that will lead you by the hand through the program's commands and options. The Assistant is the first menu to appear when the system is initially started. You may ignore its options and simply type in the command or you may choose Directory, Lookaside, Active Context, Calculator, Facilities, or End of Session. At any time, you may suppress the Assistant screen in favor of a single prompt, Next:, which indicates that the machine is waiting for the next command.

If you select the Directory, the submenus shown in Figure 1 appear in sequence. The Directory allows you to view a list of file names of a particular type (database descriptions, forms, texts, procedures, and so forth) or a general list of all the file-

Illustration: Robin Matsuyoshi



names. Once you have viewed the list, you can choose a particular file for editing, viewing, printing, updating, or some other function depending on what type of file it is. All of these choices are given to you via the Assistant's prompting system. If you are confused at any time, pressing Ctrl-L will give you one or more help screens with information about how to proceed and what your options are.

The Assistant's Lookaside feature is very handy. This selection allows you to momentarily leave your current work as it is while you do something else on screen and then to reenter your previous job where you left it by hitting the Esc key. The Lookaside option creates a psuedo two-level multitasking system. When it is invoked from the Assistant's main menu, the information you're working on remains on the screen while a smaller window appears at the lower right for you to do your other work. The smaller window has all the capabilities of the full screen and any work done within it can be saved for subsequent use.

METAFILE provides you with the Assistant, a full prompting menu system that will lead you by the hand.

The Assistant permits you to check the system's current status and memory use, structured details about the database currently being used, and other system information. All you need to do is choose Active Context from the Assistant's main menu, and you will discover among other things the current date, the system ID, the size of the screen windows in current use, and the most recent parameters for the line spacing, page width, and page depth of printed reports.

There are many times when you might like to check the result of some equation or do some calculations to set up a particular database and form. This is where the Calculator selection is handy. With this option, you can use any *METAFILE* functions that are available under its programming language, and then some. There are number, character, date, and formatting functions at your disposal for just about any type of calculation, even binary and hex conversions. The Calculator is especially convenient when used in conjunction with the Lookaside feature. The Facilities option, which appears next to last in the main menu listing, is nonetheless first in terms of power. It gives you access to all the text and database options needed to do your work. Once the Facilities option is chosen, *METAFILE*'s commands submenu in Figure 2 appears. Subsequent submenus enable you to do the actual work of building and manipulating files and databases.

The last two choices are for stopping work altogether (End of Session) and for entering *METAFILE* commands directly, without the use of the Assistant menus. The fastest and most efficient use of *METAFILE* entails bypassing the many levels of menus and entering commands directly. This brief sketch of the Assistant's menu structure only hints at what *METAFILE* can actually do and what the system is like in practice. To get a better idea, let's look at the capabilities of the database, the strongest part of *METAFILE*'s integrated system.

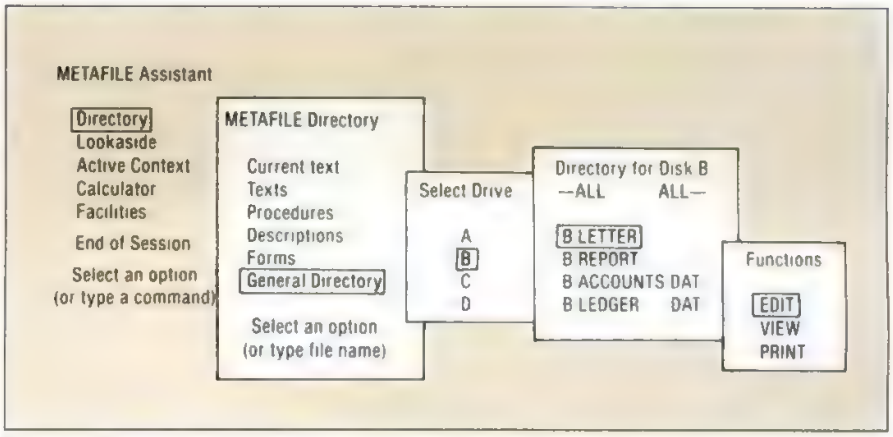


Figure 1: *The Assistant's main menu followed by the Directory submenus.*

Database Capabilities

METAFILE permits users to create more than one database, the size and number depending on the nature and extent of the data and the amount of RAM your computer has (see Figure 3). Three different kinds of data can be entered: numerical, character, and date.

The first step in setting up a database is to describe the records that it will contain, using the DESCRIBE option. A record comprises various fields, each of which needs to have its attributes defined. A fully described field contains many elements, including name, type, length, position, default value (if any), ranges, translations, input pattern, output pattern, and comments. Field names are working names at this point and as such can be greatly abbreviated. Later, when you actually create the

```
      METAFILE Commands

>     Files
      Records
      Text lines
      Data elements
      Frames
      Reports
      Procedures
      Session
      Formulas
```

Figure 2: *The first submenu for the Facilities option.*

Total Memory	Text Area	Separate Text/SORT	SORT Area	Variables	Items
128K	26K	no	26K	2175	3839
192K	63K	no	63K	2943	4352
256K	63K	yes	63K	2943	4352
320K	63K	yes	63K	4100	6400
384K	63K	yes	63K	4100	6400
448K	63K	yes	63K	4100	6400
512K	63K	yes	63K	4100	6400
576K	63K	yes	63K	4100	6400
640K	63K	yes	63K	4100	6400

Figure 3: *METAFILE's capabilities are affected by the amount of RAM available.*

form for the printed report, you have a chance to substitute full field titles appropriate to a printed version. The range limits, input patterns, and output patterns are handy for ensuring the minimum number of errors that result from incorrect data entries. The input pattern, for instance, will only accept input data in a specific format set up by you.

Once you have described one or more databases, your next step is to select one to work on. The USE command makes the selection, and the UPDATE command enables you to actually enter, change, and delete records. When you select UPDATE, the screen is filled with the names of the various fields that were established during the database description process. When data are to be entered, the record entry format appears with a number of blanks for each field corresponding to the field length specified by the DESCRIBE feature. A sample UPDATE screen, with an already completed record appears in Figure 4. Once you have entered all the records, you can look at your handiwork before creating any reports to send to the printer or screen. To do this, you use the ITEMIZE command, which steps through the records one at a time as you press the Tab key or automatically at a pace you select (one record every 2 seconds, for example).

```
FIRST_NAME          John P
LAST_NAME           Abercrombie
STREET              4354 Oak Tree Lane
CITY                Minneapolis
STATE               MN
ZIP                 55410
JOB_TITLE           Foreman
CLASS               1
MONTHLY_SALARY      2050.00
DATE_HIRED          25JAN74
DEPARTMENT          Shipping
LAST_INCREASE       01JUL83

                    Insert
```

Figure 4: *A sample METAFILE record with field names and corresponding data.*

Producing a report from the data you've entered is the next step and entails use of the LIST command. The LIST command prompts you for each field you want to report and gives you the chance to replace the working versions of field titles and output formats and to establish totals, averages, and counts for each field. You can produce a columnar report with complete control over which column to start each item in. In special cases, you can create forms in which the data will be reported in a unique format completely specified by you, not just in columns.

Forms for reporting and inputting data are created with a feature called the text editor, which is like a rudimentary word processor. Once the form has been laid out, you move the cursor to the position where you want information to appear and then press the Attention-F key (the tilde-backslash key and the F key) to insert a field area. You continue this process until all the report's data fields are inserted in the form. Processing the form entails running a procedure built with METAFILE's programming language. The program—an alternative to the UPDATE procedure—prompts a key operator to keyboard the actual data for each field. The data are automatically inserted in the proper place in the formatted report. Once a report is compiled, it can be sent to the screen, the printer, or a text file (for later insertion into a report, for instance).

How to Qualify

The last important feature of the *METAFILE*'s database facility is its ability to "qualify" records for creating reports and browsing, that is, to call them up selectively according to criteria of your own choosing. You can qualify records with the FIND command to fall within a particular range by specifying a given character string and by using comparison functions like equal, not equal, less, equal or less, greater, and equal or greater. For example, in creating a report on your employees, you might qualify the records by saying that *METAFILE* should find all records with the field titled "Salary" with a value equal to or greater than $30,000. This qualification would eliminate the records of all employees with salaries of less than $30,000 for this particular report. You can also sort all the records within a database on any field in ascending or descending order. This sorting and qualifying does not alter the original records in the database; it just selects and moves around particular records for reporting purposes only.

Among the interesting features of the database are the "positioning" commands. FIRST RECORD, LAST RECORD, NEXT RECORD, and PREV RECORD perform exactly as you would expect, positioning the database pointer to the first record, last record, and so on. The POSITION command takes you to a particular record number that you specify. With the KEY option, you can specify up to three fields to be keys for faster sorting

and qualifying. The ITEMS command allows you to look only at certain fields for reporting and updating; the records not included in the ITEMS command are temporarily ignored until an ITEMS ALL command is issued. This helps to keep the screen from being cluttered up with fields that are not pertinent to your report. Finally, there are the KEEP and DISCARD commands. Updates to the databases can be made immediately when entered (automatic mode) or can be kept in a temporary storage area until you review the changes and decide to make them permanent (manual mode). If you are in manual mode and you decide to make the changes, you enter the KEEP command; if you decide not to accept the changes, you issue the DISCARD command.

Text Editing.

METAFILE is equipped with a text editor, not a word processor. It has its good points and its bad points. It does not have all the bells and whistles usually associated with a word processor and does not perform as smoothly as such products as *WordPerfect*, *WordStar*, and *Benchmark*. It does not support superscripts, subscripts, temporary margins, footnotes, and so on without going through special contortions. *METAFILE* does permit you to send control codes to the printer, so anything the printer can do is possible as long as you understand your machine and have sufficient patience.

The text editor does have the capability to insert and delete characters in the middle of text. You can set the left and right margins, as long as you do it at the beginning of your work. Once a line is entered within one margin setting, you can not easily change margin settings and the text does not automatically realign itself. You can move, copy, delete, excerpt, or insert marked lines (but not sections of lines). Tabs are easily set and changed. You can select word wrapping and flush-right margins. You can search and replace text anywhere within the text.

The real power of *METAFILE*'s text processor lies in its ability to interact with the database in many modes. Using the different database fields as variables, you can create formulas, the results of which can be printed in the body of the text. From here, creating form letters, memos, text reports, and forms that include the results of even the most difficult calculations is an easy step. There is an evaluation mode, entered while in the editing mode, that shows the text for each record in its final printed form with embedded formulas already calculated. Reviewing each record one at a time in evaluation mode helps you to test your report to see if the information will be formatted as you planned. Figure 5 is an example of a form with embedded calculations, while Figure 6 shows the same form after it has been "evaluated." The evaluation mode is especially valuable when you include programming steps within text files.

As in the dBASE II database system, you can write many of your programs using the METAFILE language.

```
%FORMSIZE 3
%RUNNING Y

{'Employee Notice' CEN 50}


{(FIRST_NAME&' '&LAST_NAME) CEN 50}
{ADDRESS CEN 50}
{(CITY&', '&STATE&'  '&ZIP) CEN 50}

Date hired:          {MDY(DATE_OF_HIRE)}

Monthly salary:      {(SALARY/12) PAT '$J.DD'}

Bonus Amount:        {((SALARY*.25) + 1000) PAT '$J.DD'}
```

Figure 5: *A sample text file with formatted formulas prior to "evaluation."*

Programming and Procedures

The true power of *METAFILE* emerges when you combine the many text and database commands into what *METAFILE* calls "procedures." Procedures are text files containing the usual *METAFILE* commands, plus some additional control commands. As in the *dBASE II* database system, you can write many of your programs using the *METAFILE* language just as you would use BASIC or FORTRAN.

METAFILE uses "procedural control" commands that are similar to those in BASIC and Pascal. You can use IF . . . ELSE clauses or blocks to determine whether or not to perform certain commands or groups of commands. Other control commands are WHILE (repeat while a formula is true), WHERE (repeat the commands for each qualified record in a database file), and FOR (similar to a do loop).

These procedures allow you to automatically qualify certain records, sort them, and produce a polished report. There is a PROMPT command that asks you to enter information. The AT com-

mand places prompts and report information or headings at any line and column on the screen. You can also emphasize text with inverse video.

These features let you create a very professional-looking report. You can even set up multiple windows for information input and output. You might, for example, devote the upper-left quadrant of the screen to data input, while the other three quadrants could contain the corresponding reports in different formats. The possibilities are limited only by your imagination. Your procedures can also contain subprocedures and references to previously created forms and reports. As you can see, *METAFILE* is a powerful programming language.

```
                    Employee Notice


                    Joseph Wander
                    47 Village Green
                    Baldwinsville, NY  47890

Date hired:         October 27, 1982

Monthly salary:     $ 2,083.00

Bonus Amount:       $ 7,250.00
```

Figure 6: *A sample text file after "evaluation" shows how the file will look when printed.*

Designing Menu Systems

It is often very useful to limit the commands or features that you allow certain database users to have access to. *METAFILE* lets you create a form, or menu, that contains just the commands and procedures that you want to be available. For example, you might want only the UPDATE, FIND, and SORT commands and several report versions to be used by some staff members. The remainder of the staff might have access to another menu with these same commands and some additional ones. Using the menu and procedure capabilities, the MIS designer can fully configure the data to be used and the way they will be entered, sorted, qualified, and reported.

The MIS designer has another tool at his disposal: *METAFILE*'s communication capabilities. Unfortunately, they are limited: Communication must be with another *METAFILE* system, which means that what is offered is far from a universal communications package. To compound the problem, the reference manual does not explain this feature satisfactorily. If you do manage to figure it out, of course, the communications option offers an ideal way to exchange data or files with another *METAFILE* user.

The last feature, ANIMATE, is an interesting command, which, so far as I know, is unique to *METAFILE*. This command lets you display several screens of information one at a time automatically at a pace you set with the PACE command. In essence, the ANIMATE command creates a controllable slide show. As the screens slowly change, you get the feeling of a moving display or animation. The feature is especially handy for displaying charts and tables.

> Anything the printer can do is possible as long as you understand your machine and have sufficient patience.

Documentation

There are three manuals included in the *METAFILE* system: two user's guides and a reference guide. The user's guides are detailed lessons on the major features of the system. These lessons are excellent and invaluable for learning how to use *METAFILE*. The reference guide, on the other hand, is not as helpful. Set up like a dictionary of the commands and system features, the reference guide lacks important detail on several of the *METAFILE* commands. The communication feature is accorded only one page of explanation, and there is nothing in the manuals that sufficiently explains how to set up the system for different printers. The one page of instructions explaining how to select the default printer (from a list of three) proved useless.

Despite these problems, *METAFILE* works well without any annoying bugs. The commands all work as indicated in the manual, and with the help of the lesson guides and on-line system help, version 7.0 of *METAFILE* is easy both to learn and use.

What would I like to see in version 8.0? The system could use a better text editor, along the lines of a full-function wordprocessor, a true communications module, a graphics module, an office time and facilities manager, and so on and on. But this is a wish list and can't be loaded on the PC. *METAFILE* is a real software package that is available now and is the best database/text processor combination that I have seen so far. ■

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All three PGS monitors are engineered for no-compromise performance to provide you with a cleaner, sharper image than any other monitor in the same price class. The HX-12 and the SR-12 both feature uncompromising color convergence for crisp whites without color bleed. The MAX-12 offers impressive clarity in a monochrome monitor with easy-on-the-eyes amber phosphor.

And all three monitors come with a non-glare screen and a shielded cable that plugs directly into the IBM PC or XT.

The HX-12 has the highest resolution (690x240) and the finest dot pitch (.31mm) in its class. And yet its suggested retail price is comparable to many medium resolution monitors. The HX-12 brings no-compromise color to the PC and now, with the PGS RGB-80 board, to the Apple IIe as well. **Suggested retail price: $695.**

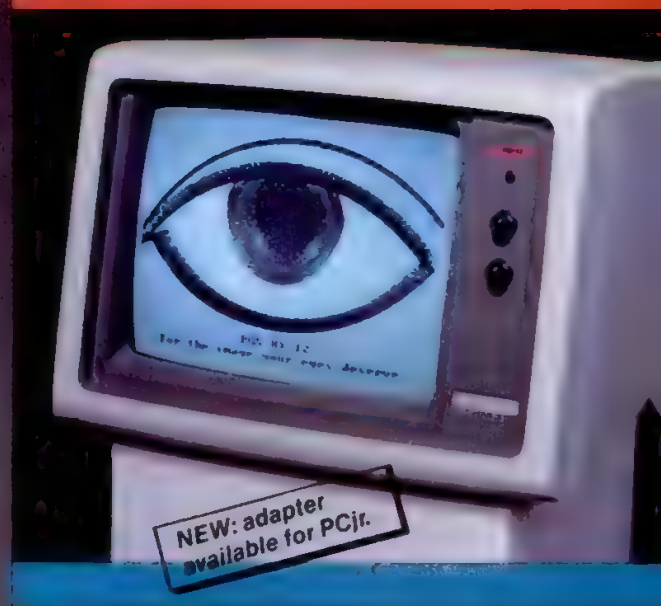
The new SR-12, in conjunction with the PGS high performance color graphics card, also features a .31mm dot pitch supporting 690 horizontal resolution. However, by increasing the horizontal scan rate to 27.5 KHz, the SR-12 can support 400 vertical resolution in non-interlaced mode. This results in a very high quality, flickerless image with the ability to generate graphics and text that is truly of monochrome quality. **Suggested retail price: $799.**

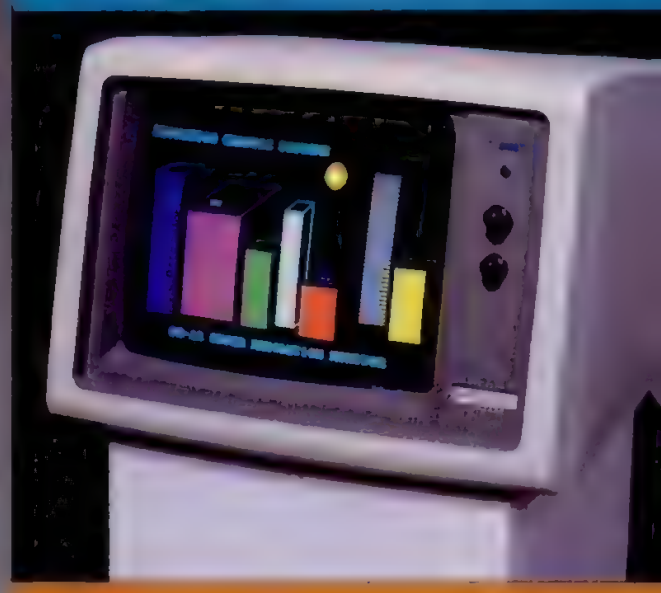
The new MAX-12 offers you easy-on-the-eyes amber with 720x350 resolution at a suggested retail price ($249) that is actually lower than the leading green-on-black competitor. And the MAX-12 runs off the IBM PC monochrome card—no special card is required.

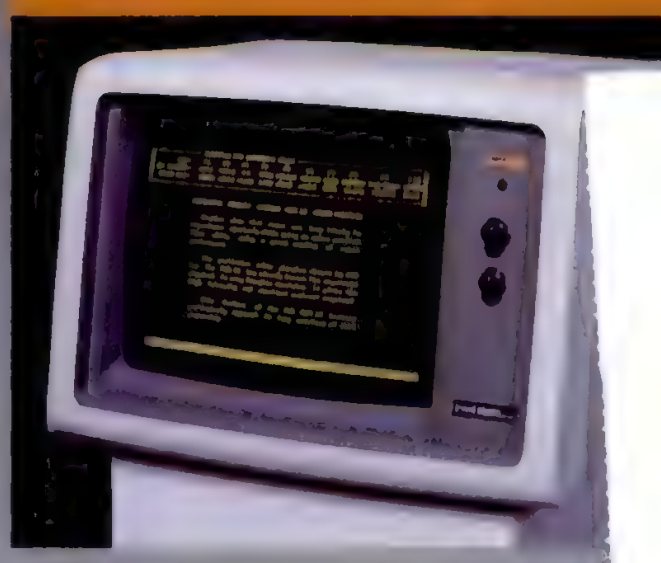
Clarity of the Max 12 is enhanced by dynamic focusing circuitry which ensures sharpness not only in the center but also in the edges and corners. **Suggested retail price: $249.**

Whatever your needs, from word processing to super resolution graphics, there's now a no-compromise PGS monitor that sets the standard. Ask your dealer for a demonstration and let your eyes decide. Or call for more information and the name of your nearest dealer.

You can look to PGS for the image your eyes deserve.







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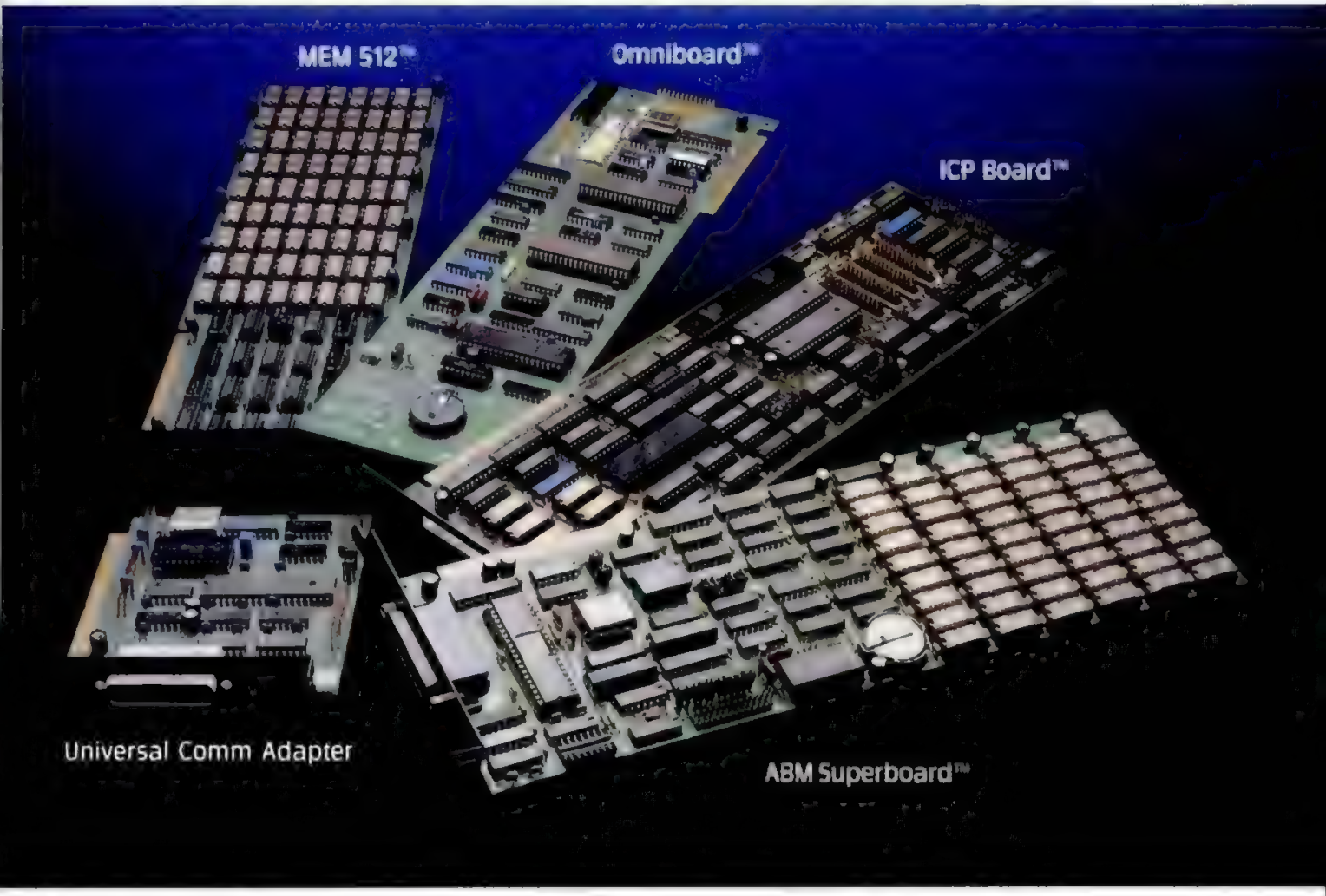
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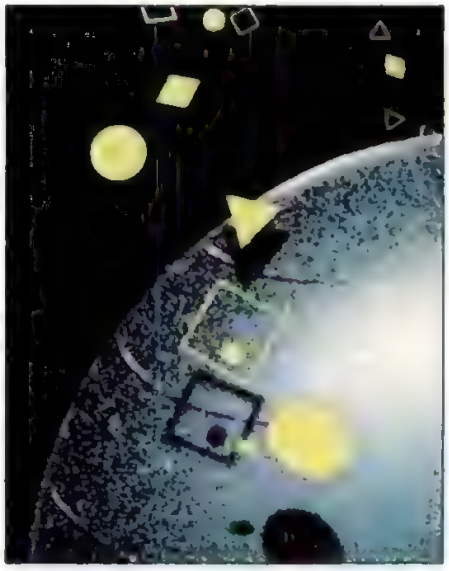
Prepare To Meet Your T/Maker III

A new version of an integrated software classic brings its power and flexibility to a PC-compatible format.

When I received my first copy of *T/Maker* in 1980, I quickly realized that this software was part of a trend that would significantly change the way people use microcomputers. This first impression turned out to be correct.

T/Maker (the name stands for Table Maker) was one of the first of the multifunction integrated software programs that have now become so popular. It was originally designed to work on microcomputers using the 8-bit CP/M operating system. *T/Maker II*, released in 1981, was an improved version of the program that sold over 25,000 copies in countries around the world.

T/Maker III is the latest edition, designed to run on both CP/M and MS-DOS microcomputers, including the IBM PC. It promises to be popular as well, and the Department of Education of the State of West Virginia has already chosen it as its standard multipurpose software for microcomputers.



T/Maker III is a tool for creating documents that integrate text, numerical tables, and graphs. It helps you create and edit text in many different ways, and it can prepare spreadsheets in a unique manner that is in some ways more flexible than the standard spreadsheet formats used by the likes of *VisiCalc* and *1-2-3*. The *T/Maker III* program has sorting and counting capabilities associated with database management programs. It can even build simple bar charts from the data in your spreadsheets. And the package's file-handling routines allow you to see and change the files on any disk drive in your system. Most importantly, the words, tables, and graphs you create with *T/Maker III* all flow smoothly together into one document that can be formatted, footnoted, and printed in a continuous process.

Its own command language allows *T/Maker III* to build self-running applications programs. You can string together a nearly endless series of commands to run as a program within the program. This command language can build interactive applications that can stop and ask for inputs and then proceed to create a completed document with new tables and graphs.

One advantage *T/Maker III* has over other integrated programs is its ability to run on many different 8- and 16-bit microcomputer systems. Each copy of *T/Maker III* comes with a special customization

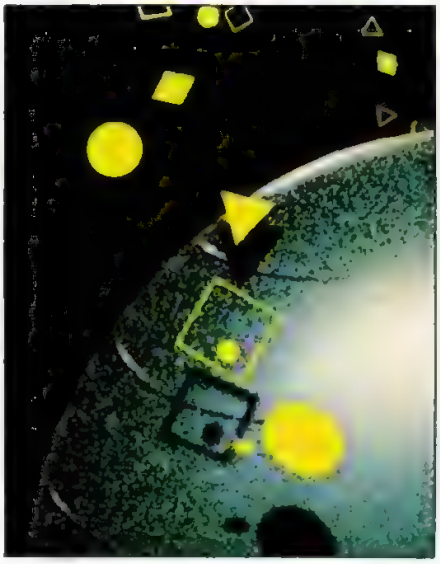
program that allows you to control the way the program interacts with the video display, keyboard, and printer port of whatever computer it's being run on. The program can thus be customized to work with many different display terminals and with microcomputers that mimic the operation of common terminals. You use the customization program to supply *T/Maker III* with the correct addresses and codes used to move information between the keyboard, the program, the screen, and the printer.

This ability of *T/Maker III* to run on a wide variety of microcomputer systems makes it valuable to corporations, institutions, and government organizations that use many different machines. *T/Maker III*, used as the standard document production software in an organization, can reduce the need for training on different programs and increase the ability to share applications and data files between different computers.

The customization program also can make *T/Maker III*'s text-editing function respond to the commands of any other word processing program. Customization allows you to select the keystroke combinations the editor will respond to and how the text will appear. If you want *T/Maker III* to move the cursor in response to the control letters A, S, D, W, E, X, and C used by *WordStar*, you can do it. If you want the Ctrl-G key combination to delete a character, you can set up the program that way. You can use all the special function keys and specially designated keys on the PC's keyboard, or you can redefine and relabel keys to meet your personal needs and preferences. You also can buy a special IBM PC version of *T/Maker III* that is already customized for the PC's keyboard and screen. And this version still contains the full customization routines, so you can make any changes you desire. Of course some actions, such as the file save commands, must be done in *T/Maker III*'s unique manner, but most common editing commands can be customized.

T/Maker III
T/Maker Company
2115 Landings Dr.
Mountain View, CA 94043
(415) 962-0195
List Price: $275
Requires: 128K RAM, one disk drive. Will also run on hard disk and PC*jr*.

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You can buy an IBM PC version of T/Maker III that is already customized for the PC's keyboard and screen.

Compare and Contrast

Comparing this program with others is a complicated process. No other integrated package has exactly the same capabilities as *T/Maker III*, so it must be compared to a series of single-purpose programs. In nearly every such comparison, *T/Maker III* shows up as flexible and powerful, but a little cumbersome to use. Flexibility isn't free.

As a word processor, *T/Maker III* flaunts its flexibility. It can create documents with lines up to 400 characters long and scroll the screen both horizontally and vertically. The total document can contain up to 44,000 characters arranged in multiple columns, wide blocks of text, or grouped as captions and titles. The editor allows you to perform the usual character and word deletion actions performed by a word processor. It will also find strings of text and automatically replace them with the text you specify. The program lacks a true block move, copy, and delete function, but lines of text can be designated for entry into a buffer and the buffer can then be written into any desired position on the page. A keystroke storage buffer allows you to quickly enter long strings of commonly used characters, such as a company name or a person's title, simply by typing Ctrl-Z.

It is easy to use *T/Maker III*'s editor to format text. You can enter text that will appear justified, ragged right, or free form. You can specify margins and positions anywhere on the document. The program can align text with right or left justification and it can add multiline footnotes, automatic page footers and headers, and page numbers. Unfortunately, you don't always see exactly what the text will look like until it is printed. If you want double-spaced text, for instance, the characters on the screen will still appear as single-spaced lines. Page breaks are not shown on the screen as you enter the text. You can touch a key and get a status line report that tells you what page and line you are on, but the position report does not update as you move along. *T/Maker III* can quickly reform the text and show you exactly what it will look like on the printer, but this is still not as helpful as seeing the actual formatted text on the screen as you enter it. You can use the commands in *T/Maker III* to arrange the text in columns on a very broad sheet and to format the lines leaving spaces for pictures, illustrations, and other inserted visual features. This is useful for creating documents,

such as some quarterly reports, that are produced on a single sheet of heavy paper and then folded to make a brochure.

But a financial report is worthless without numbers, so *T/Maker III* also gives you the capability to manipulate numbers and format the results into tables.

A Different Kind of Spreadsheet

You can create a *T/Maker III* table of numbers anywhere in a document. The same editor creates both number tables and text, so you can put lines of text above and below the table and squeeze in as many notes and explanations as your printed margins will allow. Numbers can be copied from one table to another within a document. This means you can wait until the last minute to enter a number, such as the closing price of the corporate stock, and then have the correct figure used in calculations throughout the document without having to enter it each time.

Like all common spreadsheet programs, *T/Maker III*'s table of numbers works in columns and rows. It uses formulas to manipulate numbers found in the intersections of specific columns and rows, and then places the results in locations you specify. However, the table-making format used by *T/Maker III* is very different from those used by most spreadsheet programs.

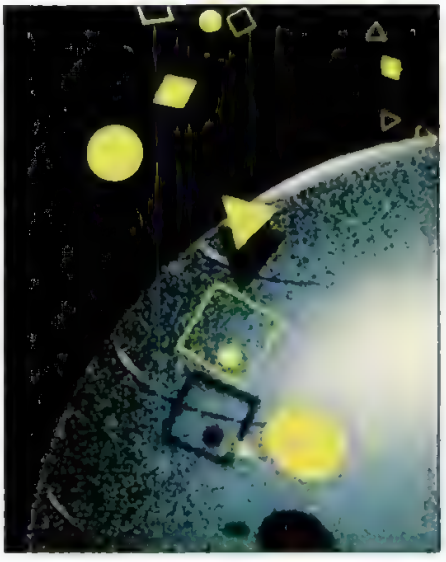
T/Maker III's formulas are arranged on the outside of the table of numbers. When you construct a *T/Maker III* table, you place the standard arithmetic symbols (+,−,/,*) in the outside margins of the table. This arrangement will seem strange if you are used to *VisiCalc*, but it is a logical system that allows you to understand the arrangement of your data more quickly than the traditional method.

The standard horizontal and vertical arrangement of arithmetic problems allows the expression 3+2=5. It also allows:

```
  3
±2
  5
```

T/Maker simply moves the signs a little so that the expression appears:

```
+ + =
3 2 5
```



Arithmetic operators don't use parentheses, but they follow a constant order.

or, as an alternative

```
+ 3
+ 2
= 5
```

If you visualize these problems arranged in columns and rows, like this:

```
+ + =
+ 3 2 5
+ 2 3 5
= 5 5 10
```

you'll have an idea of how the *T/Maker III* table works.

Lines of arithmetic functions can be stacked on top of and to the side of the table, and lines of symbols can be designated to show the order they are to follow. Arithmetic operators don't use parentheses, but they follow a constant order—add, subtract, multiply, divide—regardless of how the functions are arranged in the table.

Any single *T/Maker III* spreadsheet is limited to 25 columns. Spreadsheets can, however, be duplicated and they can feed information from one to another.

When you design the mathematical statements for a *T/Maker III* spreadsheet, you have many alternatives to the humble equals sign. There are 23 other ways you can ask for results to be shown in the table. See Figure 1 for a list.

These powerful functions make *T/Maker III* a useful program in many disciplines. Laboratory and statistical reports can be produced as easily as business reports. You do have to master *T/Maker III*'s unique way of doing things. The format isn't difficult, but it is different from what most people are used to.

The *T/Maker III* table of numbers differs from common electronic spreadsheets in other ways, too. *T/Maker III* is not good for "what-if" calculations because it does not automatically update when you enter numbers. You have to issue a COMPUTE command to tell the program to refigure its results. The process is fast, but not as fast or convenient as the automatic computation feature standard on other spreadsheet programs. When you are ready to print the final document, a CLEAN command removes the formulas from the margins of the table. (The PRINT command also contains an option that will automatically clean the formulas from the tables as they are printed.) *T/Maker III* makes it easy to save tables under different file names, so you can recall data in various forms whenever you need to.

You can take advantage of *T/Maker III*'s table-making function to create a data mask that contains special blanks showing where numbers are to be placed in the spreadsheet. Data masks extract numbers from files of numbers (other numeric tables, for example) and enter them into designated locations in another numeric table. They can be extremely useful for capturing numbers that are entered

from an interactive program created using *T/Maker III*'s command language.

List Processing

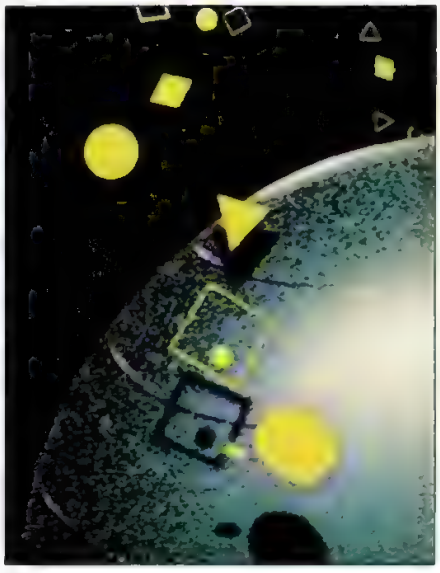
The tables you create will not be limited to numbers. Some tables may contain lists of names or items and you might want to sort or rearrange those lists in special ways. *T/Maker III* contains some very flexible searching, sorting, and formatting tools. They are as easy to use as those found in *1-2-3* or dedicated database management programs.

Lists of names and numbers are created with *T/Maker III*'s editor, so they can appear anywhere in a document you are creating. If you have existing lists, you can call them into the document and then modify them with the following commands:

- ARRANGE (use this to move columns into a different sequence and to drop unspecified columns);
- FIND, REPLACE, DROP, KEEP (use these commands to perform their indicated functions on lines containing the string of characters you specify);
- SORT (this command will sort columns of words or numbers you specify according to ascending or descending alphabetic or numeric order);
- SORT ON KEYS (this command sorts one key area at a time. You specify various keeping and discarding options and limits);
- TALLY (this command counts instances of specific occurrences. Tally can be used on any table, even one that isn't in the document, so you can quickly find a number for your report. See Figure 2 for an example).

T/Maker III's list-processing commands make it easy to create lists that are small subsets of a master list. You could use a master file of employees, for example, to create lists showing all employees over a certain salary or in any other category you choose. *T/Maker III*'s list-processing features are at least as valuable as its spreadsheet in the preparation of major documents and reports.

The use of charts and graphs can make reports more understandable and increase their appeal to readers. *T/Maker III* can produce some charts, but the program's flexibility greatly reduces the quality of the charts it can produce.



There are no menus, so if you don't know what to enter, you have to get it out of the manuals.

Since *T/Maker III* is designed to run on many different computers, it cannot make use of the special graphics available on individual systems. The charts it produces are therefore limited to the graphics capabilities of the least capable system. *T/Maker III* can produce horizontal bar charts that can be displayed on the simplest of terminals, including a mechanical teleprinter. The bar charts made by *T/Maker III* usually use standard characters such as dollar signs or crosshatches to form the bars. You can specify different characters to be used in each bar to provide contrast. You should also note that *T/Maker III* charts can be reproduced on even the simplest of printers, including inflexible daisy-wheel and thimble printers incapable of printing any other kind of chart.

You can use the *T/Maker III* customization program to select special characters for the charts if they are available on a particular display system or printer. You can even print characters in color if the printer has color capability.

T/Maker III's bar charts are not difficult to construct, but you do have to use a series of commands to specify the data to be charted and the margins to be used. Other program options are used to change the width and spacing of the bars and allow you to stack and arrange them to show the relationships between specific groups of data.

Horizontal bar charts created with *T/Maker III* are not as pretty as the stacked bar charts you can make with programs such as *1-2-3*, but they display information effectively and they can be used on systems that will produce no other type of chart.

The Command Language

T/Maker III's command language clearly shows both the flexibility and the limitations of the software. When you use *T/Maker III*, you are greeted with an aggressive little prompt that says, "WHAT NEXT?" That message typifies both *T/Maker III*'s flexibility and limitations. The problem is that you have to know exactly what to tell the program in order to get it to do anything, much less what you want it to do. There are no menus, so if you don't know what to enter, you have to get it out of the manuals. This arrangement is fine if you use the program frequently. If you are experienced with *T/Maker III*, you can string commands together and move through many steps very quickly. The commands are logical verbs (COMPUTE, PRINT, EDIT, and so on) and they are easy to learn, but if you are a new or infrequent user, your progress will be slowed by your search for the proper command. In this area, *T/Maker III* compares poorly to programs such as *1-2-3* that give you a choice

of entering a command or selecting a menu option.

T/Maker III does come with excellent manuals that make use of color and many illustrations to show how the program functions. The manuals use visual tabs and a comprehensive index to help you find information. The IBM PC version of the software even comes with manuals in the traditional slipcover case. The manual set includes a quick-reference guide that is printed on very heavy stock and is well-illustrated and indexed. It will stand up to a great deal of use, and with this program, it's likely to get a great deal of use.

> Those experienced with T/Maker III can string commands together and move through many steps very quickly.

The *T/Maker III* documentation doesn't completely offset the lack of menus or help files, but it does mitigate the situation.

Why T/Maker III?

You should consider choosing *T/Maker III* as your multipurpose software if you regularly prepare documents combining text, charts, and lists. You should consider *T/Maker III* if you belong to an organization that uses several different kinds of microcomputers, and if you want to reduce the training burden and improve the capability of sharing files by using common software. You should avoid it if you are primarily interested in performing "what-if" exercises on spreadsheets or if you will not use the program frequently enough to remember the commands.

T/Maker III is a powerful and flexible program, but it is not all things to all people. If you need the special services it can provide, *T/Maker III* can become the key program in your software library. ■

%—multiply the result by 100
#—divide the result by 100
sfh—subtract the result from 100
sfo—subtract the result from 1
rec—give the reciprocal of the result
sqr—give the square root of the result
abd—give the absolute value of the result
exp—give a value *e* to the power of the result
log—give the log of the result
l10—give the log to the base 10 of the result
sin—give the sine of the result
cos—give the cosine of the result
tan—give the tangent of the result
atn—give the arctangent of the result
ply—give the maximum of zero and the result
nly—give the maximum of the negative of the result plus zero
sgn—the sign of the result becomes the result (+1 or −1)
avr—the result is the average of positive numbers
max—the result is the largest number
min—the result is the smallest number
~—show percentage of change between designated numbers
^—raise a value to an identified power
cnt—count the items

Figure 1: T/Maker III *features 23 different arithmetic functions.*

EXPENSE ACCOUNT: JAN 1-15, 1984

DATE	ITEM	DETAIL	AMOUNT
01/03/84	TRANS	Maserati Quatroportte (used)	45,550.00
01/05/84	FOOD	dinner with Chuck and Di	1,025.47
01/06/84	LODGE	1 night, Hyatt Regency, Maui	157.49
01/09/84	TRANS	Lear Jet rental, to/from Maui	4,250.00
01/10/84	FOOD	Mom (for her birthday)	11.43
01/12/84	TRANS	Taxi fare, New York	47.50
01/12/84	LODGE	Plaza, New York	387.82
01/13/84	ENT	Broadway tickets	60.00
01/13/84	ENT	Took out star, Broadway show	395.00
01/14/84	FOOD	Brunch with same	89.45
01/15/84	MISC	"Breakfast" at Tiffany's	23,000.59
		TOTAL FOR TWO WEEKS:	74,974.75

RESULTS OF THE "TALLY" USING T/MAKER:

TRANS	•	3	49847.50
ENT	•	2	455.00
FOOD	•	3	1126.35
MISC	•	1	23000.59
LODGE	•	2	545.31

Figure 2: *The TALLY command is handy for creating summaries.*

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Desq: Through An Open Window

Excitement has begun to build around Quarterdeck's much-heralded software integrator, Desq. Here's a sneak preview.

Early software was like an angry dog—if you didn't treat it just right, it would growl at you. Since then, greater concern with user-friendly interfaces has led to programs that are much easier to use and far more forgiving when you make a mistake. The most notable to date are VisiCorp's *Visi On* and Microsoft's *Windows*.

Another member of the new breed of easy-to-use software packages is *Desq*. Although its manufacturer, Quarterdeck Office Systems of Santa Monica, California, has not even formally announced it, *Desq* is already generating excitement in the PC community. It is rather different from *Visi On* and *Windows* in that it can integrate off-the-shelf programs such as *WordStar*, *Multiplan*, and *dBASE II*. *Desq* brings many of the latest user-friendly features to programs that by themselves may be too complicated for everyday use by unskilled people.

DOS Overruled

Desq overrides the standard PC-DOS program environment to display simultaneously up to nine programs that each previously demanded exclusive use of a computer system, and to integrate the programs. It presents most programs by means of windows—which *Visi On* or *Windows* users are already familiar with—although there are some programs that still write information directly to the full screen (for example, *1-2-3* and *SuperCalc*).



You don't need to learn the commands for every program you purchase; *Desq* has a set of basic command menus that you can alter or extend. On the other hand, if you use a popular program for your word processing, the effort you already put into learning its commands won't be lost. You can still use those commands in addition to some powerful *Desq* commands.

When I first saw *Desq* about 5 months ago, it appeared to be a fairly straightforward program integrator. The idea was that you could take a group of popular programs, glue them together with *Desq*, carry out cut-and-paste operations (or mark and transfer, as *Desq* calls them), and generally smooth out a lot of the rough edges some people experience with application programs. A mouse was not essential since users could issue all window selection and manipulation commands from the keyboard, but could be supported. There were a few main *Desq* menus and some help facilities available, but Quarterdeck seemed to be offering customers nothing more than a way to integrate the programs

they had already purchased.

In its original form, *Desq* could run on an IBM PC with only 256K RAM, a 5-megabyte hard disk, and either a monochrome or color display. The size of the program has grown to the point where 320K RAM is the minimum usable memory space and 512K is preferable. (This is in line with VisiCorp's recent announcement that 512K and not 256K as was first stated is needed to run *Visi On*.)

In addition to increasing its size, Quarterdeck has polished up *Desq*, and it looks good to me. In its current incarnation, the one that will be released, *Desq* supports three mouse types: the Microsoft, Mouse Systems, and Logitech models. These devices have either two or three buttons, and *Desq* uses only two. One selects something on the screen and the other selects menu items. The program still doesn't require a mouse, however.

Desq does not get in the way—it just allows more than one application to be present on a computer display at a time by means of overlaid windows. It also makes the transference of data from application to application—that is, from window to window—a simple task.

Airing Out Applications

Quarterdeck's first attempt at designing windows appeared to be based on the Xerox/Apple concept. Each window had a border with small graphics symbols that indicated operations you could perform on the windows. In the latest version of *Desq*, the border icons are gone, and only the top edge of each window contains information. Each window is numbered and has two names: its own name tag, in the center of the top edge, and the name of the program that created it—for example, DRAFT 1 [*WordStar*]. While the active window is always on top, it can also be spotted by the horizontal bars on either side of its name tag.

To resize a window, you first make it active by clicking on it with the mouse or by pressing Alt-window number. If you are using a mouse, you then click at the new location of the right-hand corner of the window. The window will then expand to its new width. If you don't have a mouse you can resize the window by pressing the up, down, left, or right cursor key. To move a window intact with a mouse, you would first click on the top left of a window and then click at the desired new location of the left-hand corner.

Desq's window handling is good. It avoids some of the pitfalls of the *Visi On* method, in which moving a window requires you to actually redraw the whole window at its new location. And fortunately, it's as easy to transport data as it is to manipulate windows.

Desq is like an expert computer user: It knows almost everything about the programs that have been installed in its environment. It is therefore able to take one type of data, such as a collection of spreadsheet columns and rows, and convert it into a form that it can insert or import into a dissimilar program such as a text editor. It can even take a column of data from one program and, if logically possible, paste that data into another document as a row of data.

> Desq overrides the standard PC-DOS program environment to display up to nine programs simultaneously.

Nothing strange goes on when data is transported from place to place. *Desq* knows what commands have to be typed into a program to obtain a certain result. In fact, if you watch the screen carefully you will see the commands you would have had to enter manually flash by on the screen.

Originally, *Desq*'s main menu featured a range of options, and you issued commands by pressing function keys. The problem with this soon became apparent: A lot of the application programs you'll use within *Desq* use the function keys for their own purposes. The conflict is obvious. Also, without some fancy reprogramming of function keys as different programs were booted, the limit of ten function keys proved a real obstacle. Quarterdeck has now opted for the more unique and meaningful idea of using letters after each command.

Revised Menu

At the main menu level, pressing O for "Open new window" will cause a submenu that lists the type of windows that may be opened from a particular application to appear. If you select R for "rearrange windows," the screen will display a range of window-related commands such as the ability to set the default size of newly opened windows.

You can switch and close windows—that is, start work on a window that is not presently active and remove a window from the desktop—by pressing the relevant letters. It is possible for more experienced users to carry out all menu commands without first listing a menu. Simply press the Alt key and then the relevant letter. When you are working in an application and you do need to look at the main *Desq* menu, pressing the Alt key twice will display it.

While a set of basic menus is included with *Desq*, most users will wish to customize these menus as they install different programs or create special program-to-program links. To this end, Quarterdeck has included a menu editor that is itself a menu (Figure 1). It allows you to call up current system menus and add, delete, or update text and menu formats. Notice that some actual keys (Ins and Del) are used in addition to the two-letter commands such as EL to edit a line or IC to insert a comment.

Cutting and pasting data with *Desq* is much like marking a block of text with *WordStar*. From the Mark and Transfer

menu, you select B for "mark begin" to indicate the starting point from which data is to be copied and E for "mark end." The selected area is then displayed in reverse video or highlighted in some other way, depending upon the application. Moving to the target window, you indicate where the incoming data is to be put and then select T for "transfer" from the menu. During the brief review session I had with *Desq*, I made transfers between *SuperCalc* and the pie chart program supplied by IBM on its PC-DOS system disk, between *1-2-3* and *WordStar*, and between *dBASE II* and *WordStar*.

Quarterdeck intends to integrate all the "hit" packages for the PC, but it is still awaiting beta test feedback before publishing a complete list. Some programs that appear to work well are the *MultiMate*, *Multiplan*, some of the Peachtree accounting packages, and the *Crosstalk* communications package.

Desq: A Quick Learner

A key feature of *Desq* is its ability to "learn" complicated or time-consuming procedures after you have carried them out just once manually. If you regularly transfer a specific group of data from a spreadsheet into a database, for example, *Desq*'s Learn feature will handle this without any trouble. If you carry out a lot of online database interrogation (obtaining share information or listings from a particular database), *Desq* will automatically initiate and complete the log-on and data retrieval process.

With some word processing systems it is possible to create simple command files that can be saved and rerun whenever you need to perform a particular task. These so-called glossary entries can format documents in some predefined manner or they can insert or remove command symbols. While *Desq*'s learn function has something in common with these simple word processing languages, it is obviously far more sophisticated. You enter the Learn mode by selecting the equal sign (=) from the main *Desq* menu and whatever you do from that moment on will be recorded as a string of macro commands.

> Desq is a fairly inexpensive way to find out if you like to work with windows.

Let's say you open up a word processing document, log onto a database service like The Source, and retrieve some business-related information. *Desq* will note every keystroke and mouse selection you make. You can then list and edit the string of macro commands or save it in a file or menu name for future recall. By means of the Learn mode, it is conceivable that *Desq* users will create whole new application environments combining many different programs. Since I first saw *Desq*, the development team at Quarterdeck has added several new features. One is the File and Print option, which provides the user with *Desq*-type menu selections for PC-DOS 2.0 commands. You can scroll directory entries up or down on the screen, sort them by various criteria, reposition them, and mark them for subsequent action. File and Print give you a lot of control over lengthy PC-DOS directory listings.

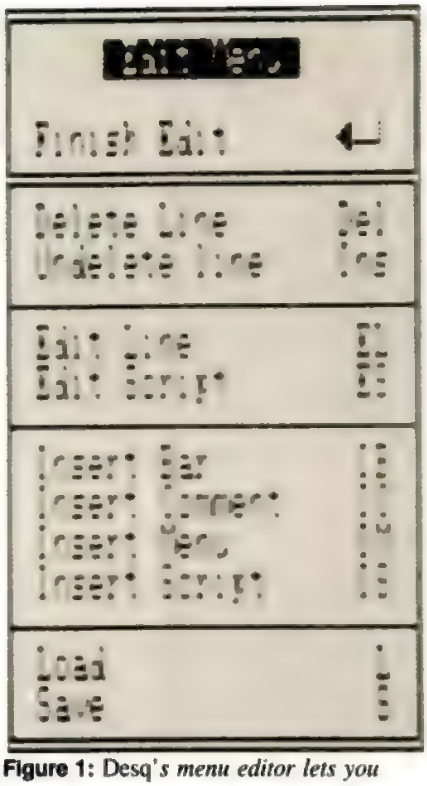


Figure 1: Desq*'s menu editor lets you customize its basic menus to fit the programs you choose to use with it.*

View, another new feature, gives you access to parts of an application program display that are normally off-limits, such as the field names in *dBASE II* files. Typically, you can edit and print out the contents of a file field but not the field names themselves. There are also times when it might be useful to get access to data sent to your computer as terminal output. In these and similar cases, the View feature captures all data displayed on the computer screen and saves it as an ASCII format file. And since View has integral "notepad" or text editor ability, you can edit any captured data and insert completely new data. In fact, it should be quite possible to create files such as a *dBASE II* command file using the View notepad.

Will Desq Make It?

By all accounts, the *Desq* concept has been well received by computer users. In just the last 4 months or so, Quarterdeck has doubled in size and managed to obtain a second round of venture capital financing. National Cash Register (NCR) announced at the COMDEX show in Las Vegas last November that it intends to support *Desq* on its own Decisionmate personal computer.

At a projected price of $399, *Desq* is a fairly inexpensive way to find out if you like to work with windows. It is also a good way to squeeze that little extra bit of functionality from any programs you may have lurking around your PC. As long as you remember that *Desq* is merely a software integrator and not an applications system in its own right, you won't end up with a nasty surprise. *Desq* may have some classy abilities, but it still has to deal with some of those programs we all love to hate. ■

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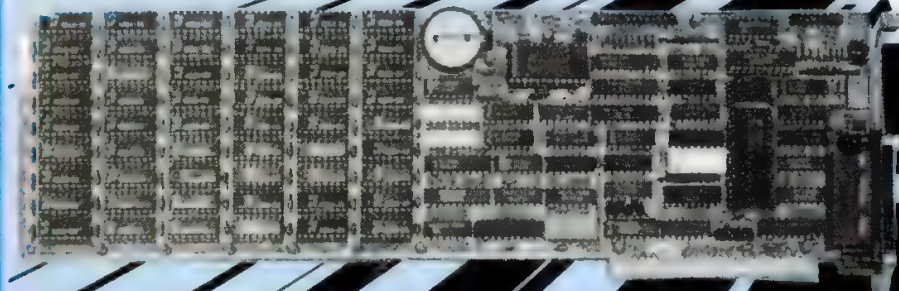
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Assembly Language: The IBM Macro Assembler

Using the Macro Assember to convert source code into its machine language equivalent is more complicated than using DOS' DEBUG. But it's also far more powerful.

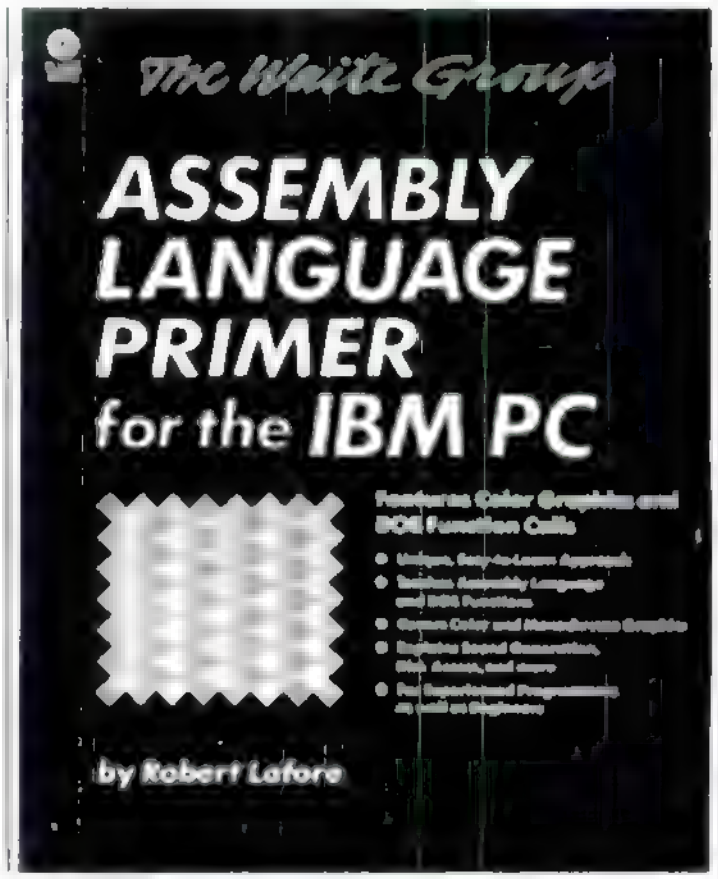
In this third excerpt from Robert Lafore's book on assembly language, the author introduces the IBM Macro Assembler, which can be used to transform source code into machine language. This installment covers Chapter 5 of Assembly Language Primer for the IBM PC, *to be published by The New American Library under the Plume/Waite imprint,* *copyright © 1984 Waite Group, Inc., San Rafael, California. All rights reserved.*

Assembly Language Primer for the IBM PC
Robert Lafore
(The New American Library, Inc., New York, forthcoming) softcover; price to be announced

CIRCLE 727 ON READER SERVICE CARD

We're going to move into the big leagues and introduce you to the macroassembler that IBM provides as the standard assembler program on the PC. We'll talk about the purpose of an assembler and its differences from the A command in DEBUG, and then use the assembler to assemble the happy-face program that was your first programming example (see "Assembly Language: More Basic Than BASIC," *PC*, Volume 3 Number 3). You'll learn how to create a source file using your wordprocessor, how to assemble and link your program, and how to convert it to a COM object file.

For practice, we'll run through the process with a program you're already famil-



iar with, the SMASCII program (see "Assembly Language: The Nature of DOS," *PC*, Volume 3 Number 5) and show you how to use another important feature of the assembler, the LST file, which gives the most complete possible picture of your program.

MASM and ASM

IBM actually provides two different assemblers on the same disk when you buy the IBM Macro Assembler. One is MASM (Meta Assembler), the full-scale version of the assembler. The other is ASM (Assembler), a small-scale version of MASM that takes up less memory and therefore loads from the disk somewhat faster than MASM but that lacks some of MASM's more sophisticated features. The difference in memory is important if you have a 64K RAM machine, since only ASM will fit in this space. To run MASM, you need at least 96K—preferably more, so you can assemble larger programs. The features left out of ASM are macros, conditional assembly, and full printout of error messages. Our preference for the present is to use ASM. Since we will be doing a great many comparatively short assemblies, it makes sense to use the fastest possible method. The error messages—which are given as numbers in ASM—are easily looked up in the back of the *Macro Assembler* manual.

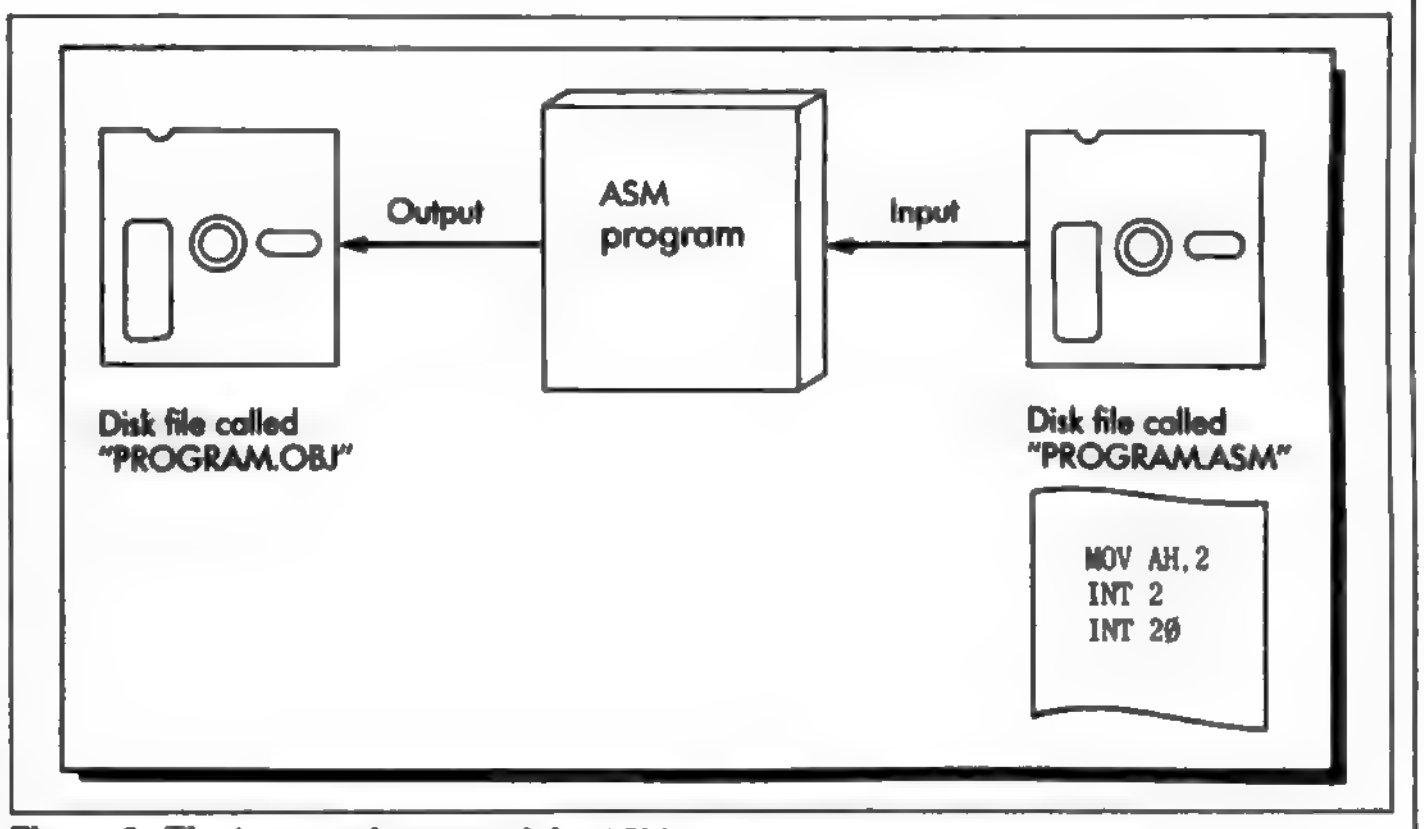


Figure 2: *The input and output of the ASM program.*

However, whether to use ASM or MASM is really a matter of personal preference (that is, if you have 96K or more). Try out both assemblers. They will operate in just the same way, except for the points noted above. The thing to remember in what follows is that every time we refer to ASM, the comments apply to MASM as well.

You will need a word processing program to create the text files that constitute the input to the assembler. It is possible to use EDLIN, the text editor included with PC-DOS. It works adequately, especially on short programs. As the programs get longer, however, you will appreciate such advanced features of a good word processing program as screen editing (moving the cursor around the screen to make corrections, rather than editing line by line as in EDLIN), the ability to move quickly from one part of a long document to another, the greater ease of making insertions and deletions in a line, and the ability to move entire blocks of text from one part of the document to another. If you are using a word processor that has a nondocument mode—that is, one designed especially for program listings (as opposed to paragraphs of prose—then you should use this feature. In any case, we are going to assume that you have either EDLIN or a word processor up and running on your system and that you are familiar enough with it to type in simple example programs.

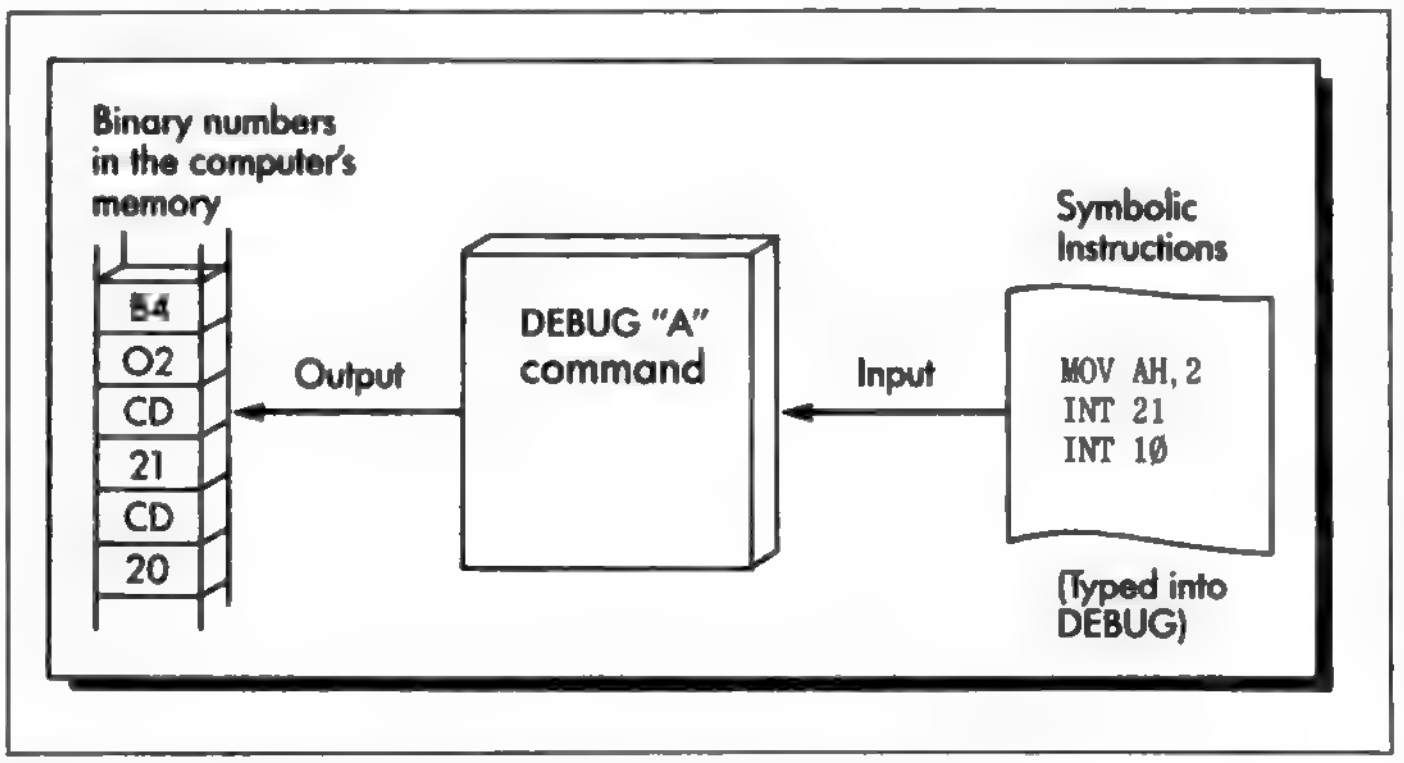
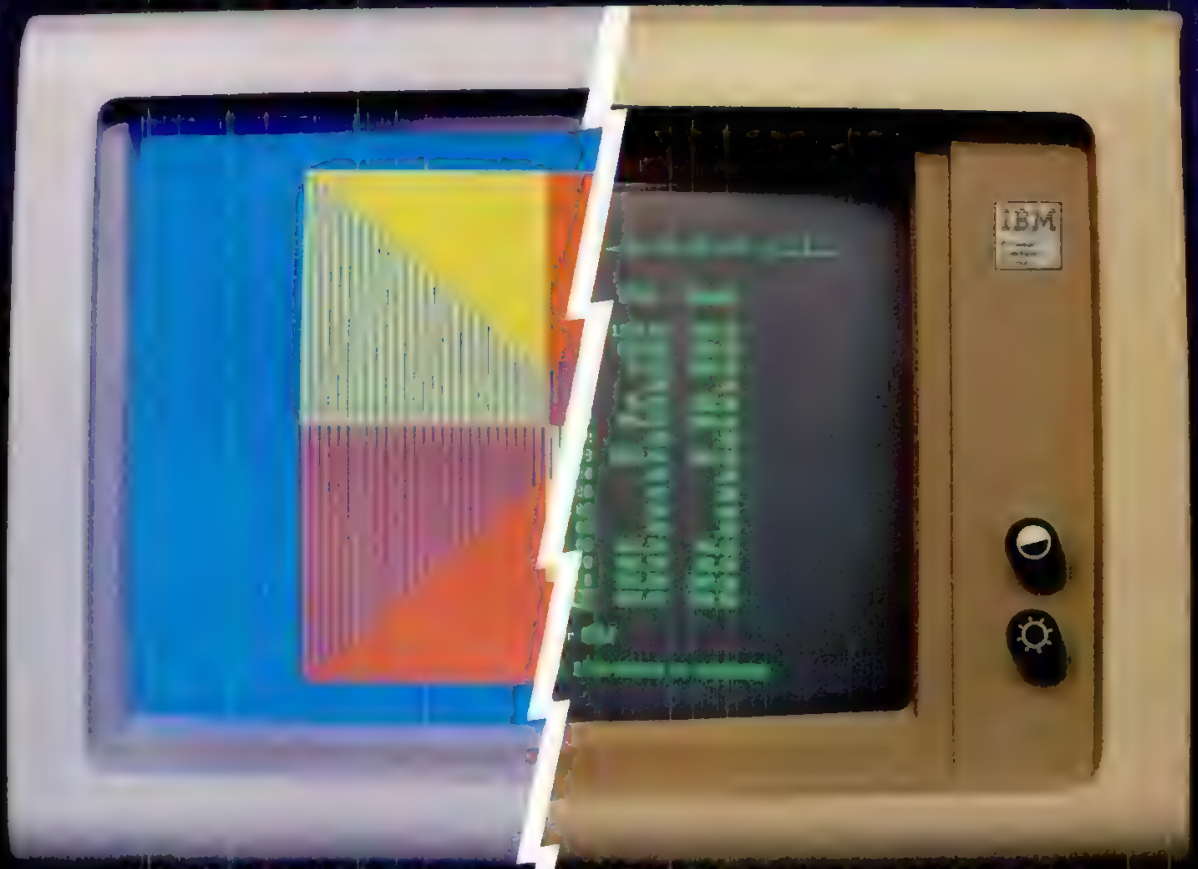


Figure 1: *The input and output of DEBUG's A command.*

What does an Assembler Do?

You already know—from using the A command in DEBUG—that an assembler takes symbolic instructions (like MOV AH,2) and transforms them into machine language, the binary numbers that are actually placed in the memory of the computer to be executed by the 8088 microprocessor (like 10110100 00000010). A hexadecimal representation of these two binary numbers (B402) is displayed when

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we use the U command in DEBUG to "unassemble" our program. A program consisting of binary numbers can then be saved on the disk as a COM file. The input-out process for the DEBUG A command is depicted in Figure 1.

A true assembler such as ASM (or MASM) operates somewhat differently than the DEBUG A command. First, instead of typing the symbolic instructions directly into the program as you do in DEBUG, you type them into a completely separate text file created with a word processing program. This text file—which you must always give the file extension ASM (as in MYPROG.ASM)—then becomes the input for the ASM program.

The outputs of the A command and ASM differ from one another, also. The A command simply puts binary numbers into the computer's memory in the form of a program that can be immediately executed. ASM, on the other hand, creates a disk file called an OBJ (for object) file, which cannot simply be loaded into memory and executed. It is in a complex format and contains informaton about where various parts of the program are to be loaded and how they can be combined with other programs. Figure 2 shows the input and output of the ASM program.

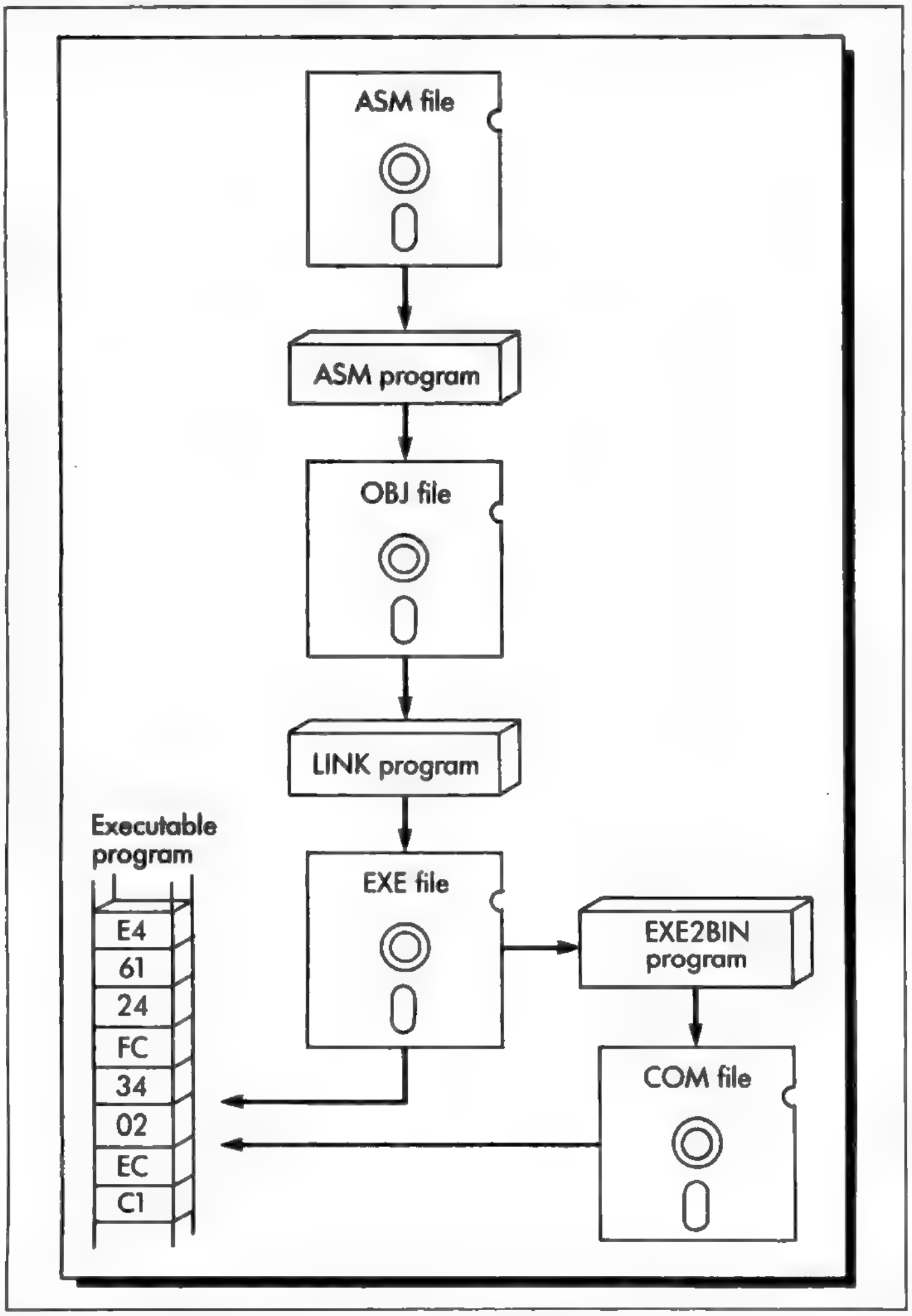


Figure 3: *The relationship of ASM, LINK, and EXE2BIN files.*

The LINK and EXE2BIN Programs

It's the job of a completely different program, called LINK, to turn the OBJ file into one that can be loaded into memory and executed. At this point we don't need to know too much about what LINK does. We do need to know that the output of LINK is a file type called an EXE (for execute) file. EXE files can be loaded into memory directly and executed. If they are written correctly, they can also be converted into COM files, which are just the same as the COM files that result from saving to disk a program typed into DEBUG using the A command. A program called EXE2BIN (EXE to BINary) is used for this conversion. (Actually, EXE2BIN gives its output file—unless it's told otherwise—the extension BIN, but this in essentially the same as COM.) Figure 3 shows the relationship of the program ASM, LINK, and EXE2BIN to ASM, OBJ, EXE, and COM files.

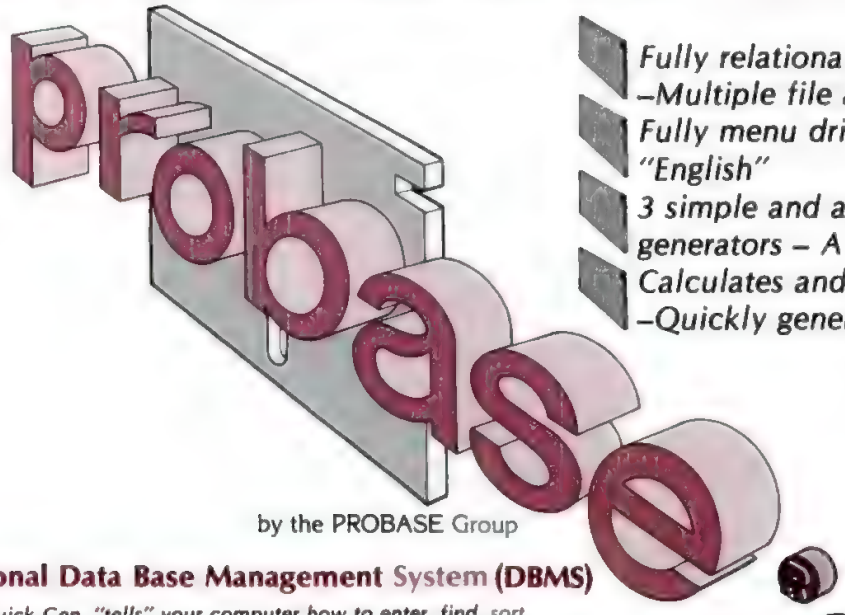
COM or EXE, What's the Difference?

Both COM and EXE files can be loaded into memory and executed as programs. What's the difference between them, and why would we prefer one over another?

A COM file, the simplest way of storing a program, consists only of the binary numbers that make up the program. Since apart from these binary numbers there is no other information in the file, a COM file takes up the smallest possible amount

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```
prognam segment

        assume cs:prognam

        mov dl,1
        mov ah,2
        int 21h
        int 20h

prognam ends

        end
```

These additional statements are necessary when using ASM

Figure 4: *A source file called HAPPY2.ASM.*

of space in memory; an EXE file, which also contains a "header" consisting of various information about the file, is much longer. If your program is 100 bytes long, the COM file will be 100 bytes long. An EXE file, on the other hand, has a *minimum* length of 640 bytes, even if your program is only two bytes long. Because they are smaller and simpler, COM files load faster than EXE files.

Another advantage of COM files for our purposes is that they can make use of the simple INT 20 command to return to DEBUG. INT 20 works all right in EXE programs executed directly from DOS, but in DEBUG it causes trouble. EXE files require a more complex return procedure, so we can avoid a little overhead by using COM files.

On the other hand, there are disadvantages to COM files. First, they cannot occupy more than 64K of memory space. Though not a problem in the kind of relatively small programs we will be writing, for large-system programs this can be a disadvantage.

Second, COM files cannot be linked up with other files when they are loaded. The real purpose of the LINK program is to combine several different programs into a larger program when they are loaded. This linking can have all sorts of advantages in sophisticated programming situations.

The third advantage of EXE files is that they make it easier to use different memory segments to perform different functions. For the time being, this advantage is not important to us.

The final advantage of EXE files is important to us: to turn an ASM file into an EXE file takes one less step than to turn it into a COM file: the extra step is the use of the EXE2BIN program to change the EXE file into a COM file. Though this is not a serious inconvenience for short programs, all things considered, it seems easiest for us to begin by producing COM files. (See Figure 3 for the relationship of ASM, LINK and EXE2BIN files.)

ASSEMBLING YOUR FIRST PROGRAM

Now that you have a rough idea of what an assembler is supposed to accomplish, let's give ASM (or MASM, if you have chosen to use it) a try and see how it works in practice. Our first program will be a very simple one: Putting a happy face on the screen.

There is plenty of room on a double-density, double-sided diskette for all the files we'll be using to assemble programs. These files are:

```
ASM
Word Processor Program
  (including overlays)
LINK
EXE2BIN
DEBUG
The ASM file for our program
The OBJ file for our program
The EXE file for our program
The COM file for our program
The LST file for our program
  (more on this later)
```

If you have disk drives with a smaller capacity, you may need to distribute these programs between two different diskettes. You could, for instance, keep the word processing program and the ASM files of your programs on one drive and the ASM, LINK, EXE2BIN, and DEBUG programs on the second drive. There are too many variables to recommend a system that will apply to everyone; we'll assume that all programs are on a single diskette in the A drive.

Creating the ASM File

Set up your word processing program (or EDLIN) to create a file called HAPPY2.ASM. (The "2" distinguishes this happy-face program from the one in the first installment of the *Assembly Language Primer* in *PC*, Volume 3 Number 3.) Note that you don't have a choice about the file extension ASM: All files used as input to the assembler *must* have this extension.

Now type in the program that is shown in Figure 4. (Note that the segment name used in the first, second, and next-to-last lines of the program is "prog*n*am," not "prog*r*am.")

A tab setting of 8 on your word processor is useful when you wish to space over to the column where the instructions are, although the assembler does not distinguish between a tab and an equivalent number of spaces. We use two spaces between the operator (the instruction itself, like MOV or INT) and the operand (the thing that the operator operates on, like DL, 1 and 21H).

The blank lines are inserted for clarity, to separate parts of the program that do different things. You can put them in with your word processor by simply hitting Enter twice at the end of a line.

Once this program is typed in as shown and saved to your disk as HAPPY2.ASM, it becomes the source file for your program. We'll explain how to assemble it in

a moment, but first let's make sure we understand all of the details.

You should recognize the entire middle part of the program: It's almost exactly what was typed into DEBUG using A in order to create the first happy-face program.

There is one subtle difference, though. The numbers 21 and 20 are followed by an h. Whereas DEBUG always speaks hexadecimal, ASM assumes numbers are decimal unless told otherwise. This doesn't matter on smaller numbers that are the same in decimal and hex, but it's very important for all numbers over 9. It's also very easy to forget, so if your program doesn't work, this is one of the first things to look for: Are all hex numbers followed by h?

Although the middle part of the program is roughly the same as the DEBUG version, four new lines have been added at the beginning and end of the program. Let's take a look at them and see exactly what they do.

Two of the new program lines form a pair. These are:

```
prognam segment
```

and

```
prognam ends
```

These lines tell ASM and LINK that the program will be located in a segment called *prognam* (for PROgram NAMe.) You can use any name you like, but the paired statements must be here, and the same segment name must be used in both. You must accept these lines on faith: they're there, they must be there, and that's how it is.

Similarly, the line

```
assume cs:prognam
```

must also be included at the start of the program to tell the assembler that the segment where the program is, prognam, is the one that will be in the CS (code segment) register. It's not clear why the assembler can't make this assumption by itself, but it can't.

The DB pseudo-op is an instruction to the assember (either the DEBUG A command or to ASM) to put certain bytes into memory. END is also a pseudo-op. Its purpose is very simple: It tells ASM that the program is over and not to expect any more program lines. Failure to include END at the end of your program will cause the assembler to generate petulant error messages, although it will still assemble correctly. Later we'll see that END can also be used to specify the starting point of a program.

Now you know about all the parts of the program in the ASM file. Remember the four new lines you've learned:

```
prognam segment
assume  cs:prognam
prognam ends
end
```

These same lines (with perhaps a different segment name) will appear, always in the same order, in all the programs you write to generate COM files.

Using ASM to Create the OBJ file

The next step is to assemble the program. We'll assume that you have HAPPY2.ASM (the file you have just created), the program ASM (or MASM), the program LINK, and the program EXE2BIN on the disk in drive A.

You then type:

```
A>asm happy2
```

Notice that you don't type the file extension following the file name. The assembler assumes that any file it's going to assemble has the extension ASM. If you type in the extension, the assembler will be confused and cause trouble.

The assembler will respond with a sign-on message and then ask you to tell it the names of three files: the OBJ file discussed above; the listing file (LST), which we'll ignore for the moment but come back to later; and the cross-reference file (CRF), which we will also momentarily ignore. The assembler has already decided what names you are likely to give to these files and included them in square brackets as default values (*default* is what you get if you don't specify something else). These default values are HAPPY2.OBJ, NUL.LST, and NUL.CRF. The name NUL means "no file," so in fact no list or cross-reference files will be generated if these NUL names are used. To invoke these default values, all you have to do is press the Enter key after each of the colons.

```
The IBM Personal Computer Assembler
Version 1.ØØ (C)Copyright IBM Corp 1981

Object filename [HAPPY2.OBJ]:        ← Press ENTER for HAPPY2.OBJ
Source listing  [NUL.LST]:           ← Press ENTER for no LST file
Cross reference [NUL.CRF]:           ← Press ENTER for no CRF file

Warning Severe
Errors  Errors
Ø       Ø
```

Figure 5: *When you assemble the HAPPY2.ASM file, the assembler asks for the names of three files.*

Figure 5 shows what the assembler prints. Once you've pressed Enter 3 times, ASM will assemble the program. For a few seconds, you'll hear the disk clicking as it reads the ASM file and writes the OBJ file.

Once the program is assembled, the number of "Warning Errors" and "Severe Errors" is printed out. This is the moment of truth, and it's hard not to feel a little rush of adrenaline while you wait to

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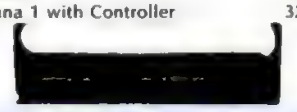
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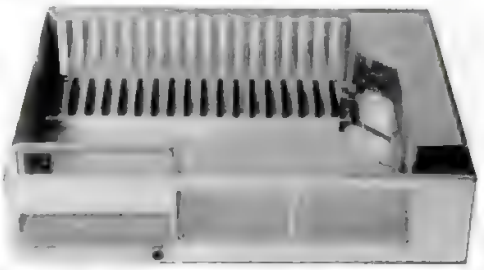
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see whether your assembly will be perfect, or whether disastrous errors will cause extensive rewriting of your program.

Warning errors are caused by things the assembler doesn't understand but doesn't deem serious enough to keep the program from assembling correctly. Severe errors are those that cause the assembler to believe a nonfunctional program will result. You should go back and fix up both kinds of errors before going on to use LINK.

If there are errors, their reference numbers (or a brief description, if you're using MASM) will be displayed on screen immediately following the program line they occur in. You can cause them to be printed if you toggle on your printer with Ctrl-PrtSc before you call ASM. (They will also be included in the LST file, which will be generated if you type HAPPY2.LST in response to the second file name. We'll get to the LST file soon.) All the errors and a few lines describing likely causes for them are listed in Appendix A of the *Macro Assembler* manual. You will probably be spending many hours browsing through this section, so make sure you can find it.

At this point, any errors should be the result of mistakes you made while typing in the program. A frequent error is number 10, "Syntax Error," which occurs when the assembler can't figure out what you're trying to say. Typing mistakes can generate all sorts of strange messages, some of which can be very obscure, so the first thing to do if errors occur is to proofread your ASM source file. When you find the error, correct it with the word processor, then go back and reassemble the ASM file. Do this until you achieve an error-free assembly.

The result of a successful assembly is the HAPPY2.OBJ file. When the assembly is completed, you can use DIR to look for the filename on your diskette.

Using LINK to Create the EXE File

Assuming that you now have the HAPPY2.OBJ file on your disk, the next step is to convert it to an EXE file, using the LINK program.

Type the following:

```
A>link happy2
```

Again, you must not use a file extension. LINK is expecting an OBJ file, and telling it that it has one will only confuse it. The linker will respond with messages similar to those of the assembler. The Run file is the EXE file that we want. The List file, useful if we are linking larger programs together, will not be useful now. Libraries are groups of programs that you may call on in special circumstances to combine with your program (such as those used when linking Pascal programs), but they will not concern us here. So you simply press the Enter key in response to all three file names just as you did with ASM: (see Figure 6).

The phrase "Warning: no STACK segment" and the fact that there was "1 error detected" have no meaning for us at this point. Stack segments are not used in COM files, so there's no way we can get rid of these error messages. This is unfortunate, since they sit there making us feel a little nervous, even after we've proved that our program is going to run just fine. The linker can generate all sorts of other error messages as well, but if you've typed in the program in Figure 6 correctly, they should not appear.

As a result of this linking process, the file HAPPY2.EXE should be on your disk. Use DIR to make sure it's there.

Creating a COM File with EXE2BIN

EXE2BIN is easier to use than ASM or LINK. To create a COM file with it, you merely type exe2bin, then the name of the EXE file you want to convert, again without the file extension, and finally the name of the file you want to convert it to, this time (just to keep you on your toes) with the file extension (see Figure 7).

The default value of the second name is a file with an extension of BIN, so if you leave the second name out, like this:

```
A>exe2bin happy2
```

you'll get a HAPPY2.BIN file. If you then want to run this directly from DOS, you'll have to convert it to a COM file with the RENAME utility. So the first approach—typing in the desired COM file—is simpler.

You should now have a file called HAPPY2.COM on your diskette. You can execute this file directly from DOS simply by typing the filename—no extension is required (see Figure 8).

```
IBM Personal Computer Linker
Version 2.00 (C)Copyright IBM Corp 1981, 1982, 1983

Run File [HAPPY2.EXE]:      <---Press ENTER for HAPPY2.EXE
List File [NUL.MAP]:        <---Press ENTER for no MAP file
Libraries [.LIB]:           <---Press ENTER for no LIB files
Warning: No STACK segment

There was 1 error detected.
```

Figure 6: *Converting the HAPPY2.OBJ file to an EXE file.*

```
A>exe2bin happy2 happy2.com
          ↑      ↑
     EXE file  COM file
  (no extension) (extension.COM)
```

Figure 7: *Creating a COM file with EXE2BIN.*

```
A>happy2      ← You type the program name
☺             ← Happy face appears
A>            ← Returns to DOS
```

Figure 8: *Executing the HAPPY2.COM file directly from DOS.*

```
A>debug happy2.com              <---you type this to load program
-g                              <---you type this to execute program
☻                               <---program prints happy face
Program terminated normally.    <---return to DEBUG
-                               <---new DEBUG prompt
```

Figure 9: *Loading and executing HAPPY2.COM from DEBUG.*

You can also execute the program from DEBUG, after loading it in when you call up DEBUG. In this case, you do need the file extension (see Figure 9). (Learning when to use extensions and when not to use them is, as you can see, part of an elaborate initiation process.)

With this more complex assembler approach, we haven't progressed much beyond where we were when we typed in the program using the A option in DEBUG, and there don't seem to be any benefits. So far, that's true. The advantages of the assembler only begin to be apparent when we work with longer programs. However, before we plunge into really big programs, we need to increase our familiarity with the assembler and the assembling process.

Let's do a slightly longer program now—one that shows off (among other things) one of the really nice features of the assembler: symbolic addressing, in which names are used for addresses instead of numbers.

ASSEMBLING SMASCII2

The program SMASCII prints out all the ASCII characters just once and then returns very nicely to DOS or DEBUG. Hop into your trusty word processor and type it in, using the assembler format from the last example and following the listing in Figure 10.

As you can see, there are several new things in this program. The most obvious is that the program lines have comments added to them. Comment lines are a really valuable aspect of assembly language, as compared at least with interpreted languages like BASIC. You can put as many comments in the source file as you like—they won't add anything to the OBJ, EXE, or COM files. All they do is make the program much easier to understand.

Not all programmers add a comment to every line, as we have done here, but they probably should. An assembly language source file is not necessarily an easy thing to understand, and the more comments you add, the easier it becomes. Don't forget that even if no one is ever going to look at your program but you, what's clear to you now may become obscure in a few months when you go back to make a change in the program. And if anyone else ever does look at your listings, comments are even more important.

For an example of good use of comments, look at the ROM BIOS listing in Appendix A of the IBM *Technical Reference* manual. Every line (unless it's part of a table of similar items) has a comment.

The rule for using comments is very simple: Comments must start with a semicolon. They can occur anywhere on a line, but everything following the semicolon will be treated as a comment and it will be ignored by the assembler. The usual places to start comments are at the beginning of the line and at the beginning of the comment field.

What's a "field"? It's simply one of the parts of a line of assembly code. There are four fields: the label field, the operator field, the operand field, and the comment field. Figure 11 is an example of an instruction that uses all four fields.

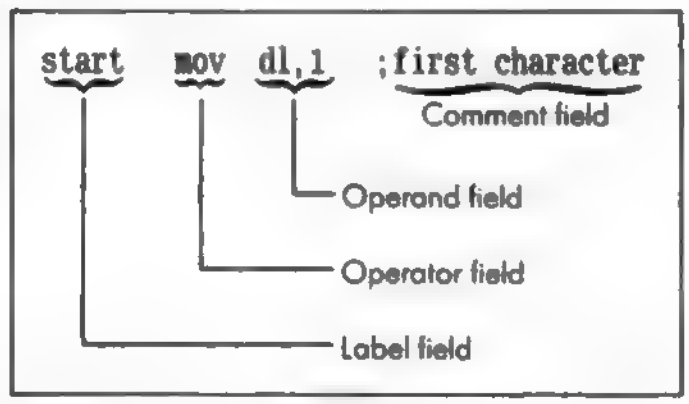


Figure 11: *An example of an instruction that uses all four fields of assembly language code.*

```
prognam segment         ;start of segment

        assume cs:prognam  ;assume what's in CS

        mov  cx,100h    ;put count in CX
        mov  dl,0       ;first ASCII character
next:
        mov  ah,2       ;Display Output funct
        int  21h        ;call DOS to print
        inc  dl         ;next ASCII character
        loop next       ;do again, unless done

        int  20h        ;return to DOS

prognam ends            ;end of segment

        end             ;end of assembly
```

Figure 10: *The program SMASCII prints out all the ASCII characters once and then returns to DOS.*

You've met operators and operands before. The comment field, to the right of the operand field, is separated by one or more spaces or tabs. We'll talk about the label field next.

Symbolic Addresses

You've probably noticed another new aspect of the program: the word "next:" halfway through the program and "loop next" at the bottom. What do they mean?



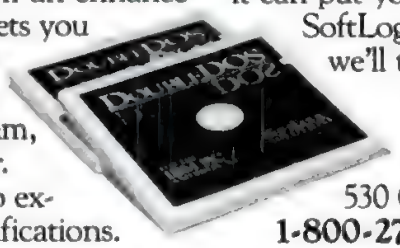
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In the DEBUG version of this program we said "loop 105" in order to jump back and display the next character. You can see by comparing the two versions that the word *next* now stands for the address 105. The advantage of using a symbolic name is that when we're writing the program we don't need to know, or care, what actual address we'll be jumping back to. We just put the label—as the "next:" in the left column is called—at the appropriate line in the program. Then whenever we want to refer to this place in the program, we don't need to know its address, we simply refer to the name used as the label.

One of the more obvious benefits of labels is that they make it easier to change a program—by adding or deleting a line, for instance. Suppose we added an instruction to the early part of the SMASCII program so that instead of looping back to 105, we were looping back to 107. If we were using numbers for addresses we would have to change the LOOP instruction itself to LOOP 107. But if we're using labels, no change is necessary, since the assembler will now figure out where the "next:" label is and will modify the LOOP NEXT instruction accordingly.

The label can be quite long, up to 31 characters. This makes it possible to use quite descriptive labels, like "line_input-_flag" (separate words in multiword labels can be separated by underline symbols). However, the use of very long names tends to make it harder to produce an organized-looking listing, since it's harder to get the columns to line up. We'll stick to fairly short names, but for an example of some longer names, look at the ROM BIOS listing in your IBM *Technical Reference* manual, and at *Bluebook of Assembly Language Routines for the IBM PC* by Christopher Morgan (New York: Plume/Waite, New American Library, 1984).

The label field is the first one on each line. It's separated from the operator field by one or more spaces or tabs, as usual. We'll show you many more examples of labels used for symbolic addresses as we go along.

```
                                                        PAGE    1-1

0000                            prognam segment         ;start of segment

                                        assume cs:prognam ;prognam in CS

0000  B9 0100                           mov  cx,100h    ;put count in CX
0003  B2 00                             mov  dl,0       ;first ASCII character
0005                            next:
0005  B4 02                             mov  ah,2       ;Display Output funct
0007  CD 21                             int  21h        ;call DOS to print
0009  FE C2                             inc  dl         ;next ASCII character
000B  E2 F8                             loop next       ;do again, unless done

000D  CD 20                             int  20h        ;return to DOS

000F                            prognam ends            ;end of segment

                                        end             ;end of assembly


Segments and groups:                                    Page    Symbols-1

                N a m e                 Size    align   combine class

PROGNAM. . . . . .              000F    PARA    NONE

Symbols:

                N a m e                 Type    Value   Attr

NEXT . . . . . .                L NEAR  0005    PROGNAM

Warning Severe
Errors  Errors
0       0
```

Figure 12: *The LIST file shows us the assembler's input and output.*

We're going to assemble SMASCII2 in just the same way as we did HAPPY2, with one exception: We're going to generate a new file, the LST or list file, one of those for which we used the default value NUL last time. The reason we want to produce this file will become obvious.

With your SMASCII2.ASM file and ASM and LINK on the same disk, call up ASM and answer its questions the same way as before, except that for the second file name, instead of hitting Enter, type the program name. You can also add the file extension LST, but it's not necessary, since if you don't type it LST will be added automatically.

The LST File

Now if you use DIR to look at the directory you'll see a new file: SMASCII.LST. Use the TYPE function from DOS to type it out. It should look like Figure 12.

Well, isn't Figure 12 the slickest thing you ever saw? All the addresses and actual machine language are printed out next to the symbolic instructions that represent them. This is a fascinating listing because it shows us what the assembler did. The input to the assembler, the source or ASM file, is represented by the columns on the right, and the output—the object or OBJ file—is represented by the columns on the left. There is a lot of space between these two columns because the assembler, as you will see later on, often generates a lot of hexadecimal numbers for a single assembly language instruction.

This part of the LST file, showing the program, is the bread-and-butter file when debugging assembly language programs. To debug a program, or even to under-

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stand it completely, it's usually necessary to be able to look at both the assembly language and the machine language versions of the program side by side. The machine language by itself is too obscure and hard to understand, and the assembly language object code doesn't tell you what the assembler program has really placed in your computer's memory. You will generally need to print out the LST file on your printer to get the full benefit from it, although it is possible to debug programs without the printed version. With DEBUGS's powerful T (for trace) command, this LST printout will prove invaluable for following what is really going on in your program.

Following the program are two lists called "segments and groups" and "symbols." The segment name you used in the program is the only entry in the first list, and the label "next" is the only entry in the second. These lists are generated because in larger programs it often helps to be able to look up quickly the location of a particular symbol or segment name. For the smaller programs we will generally be concerned with, these lists are not so important and can usually be ignored.

From Linking to Execution

The linker is used just as it was before (see Figure 13).

And again this should generate an EXE file, whose existence you can check using DIR.

To convert the EXE file to a COM file, type the following:

```
A>exe2bin smascii2 smascii2.com
```

As before, SMASCII2 can be executed either from DOS or from DEBUG. From DOS, type:

```
A>smascii2
```

and from DEBUG, type:

```
A>debug smascii2.com

-g
```

Either way, the program should run just as it did when you created it with DEBUG's A command. If not, back to the old drawing board: There's probably a typo somewhere.

```
A>link smascii2

IBM Personal Computer Linker
Version 2.ØØ (C)Copyright IBM Corp 1981, 1982, 1983

Run File [SMASCII2.EXE]:        ← Press ENTER
List File [NUL.MAP]:            ← Press ENTER
Libraries [.LIB]:               ← Press ENTER
Warning: No STACK segment

There was 1 error detected.
```

Figure 13: *Using the LINK command to create an EXE file.*

MACHINE LANGUAGE OP-CODES

Now that you have a LST file to study, you may wonder exactly what the correspondence is between the assembly language mnemonics and the hex numbers in the resulting machine code. For instance, you have probably noticed that INT 20 always translates into the hex number CD followed by the hex number 20. CD is obviously the op-code for INT, and the 20 is simply an 8-bit number, so this instruction isn't hard to figure out.

However, for other instructions, like MOV, things can get rather complicated, and all sorts of different hex numbers can turn up in the machine language translation. In the SMASCII listing in Figure 12, for example, B9, B2, and B4 are all used for the MOV instruction. How does the assembler know which of these numbers to use? And do we really need to know how it knows?

We aren't usually going to be too concerned with the actual numbers stored in our computer's memory. After all, you have the assembler to generate these numbers for you, and if you want to know what certain numbers mean, you can always use the U command to disassemble the code.

Once in a while, however, it's useful to know the exact binary equivalent of a certain instruction. Figuring it out can be an obscure process, but let's run through it for a sample instruction, say, the MOV CX, 100h instruction, which is the first one in the SMASCII program in Figure 12. The machine code equivalent of this instruction, as shown in the LST file, is B9 0100. The 0100 is clear enough—it's simply the constant that will be moved to CX. But where does the B9 come from?

First, look up MOV in the IBM *Macro Assembler* manual. You'll find several sections devoted to this instruction. The one you want is "TO Register FROM Immediate-data." Under "Encoding," you'll see the cryptic notation

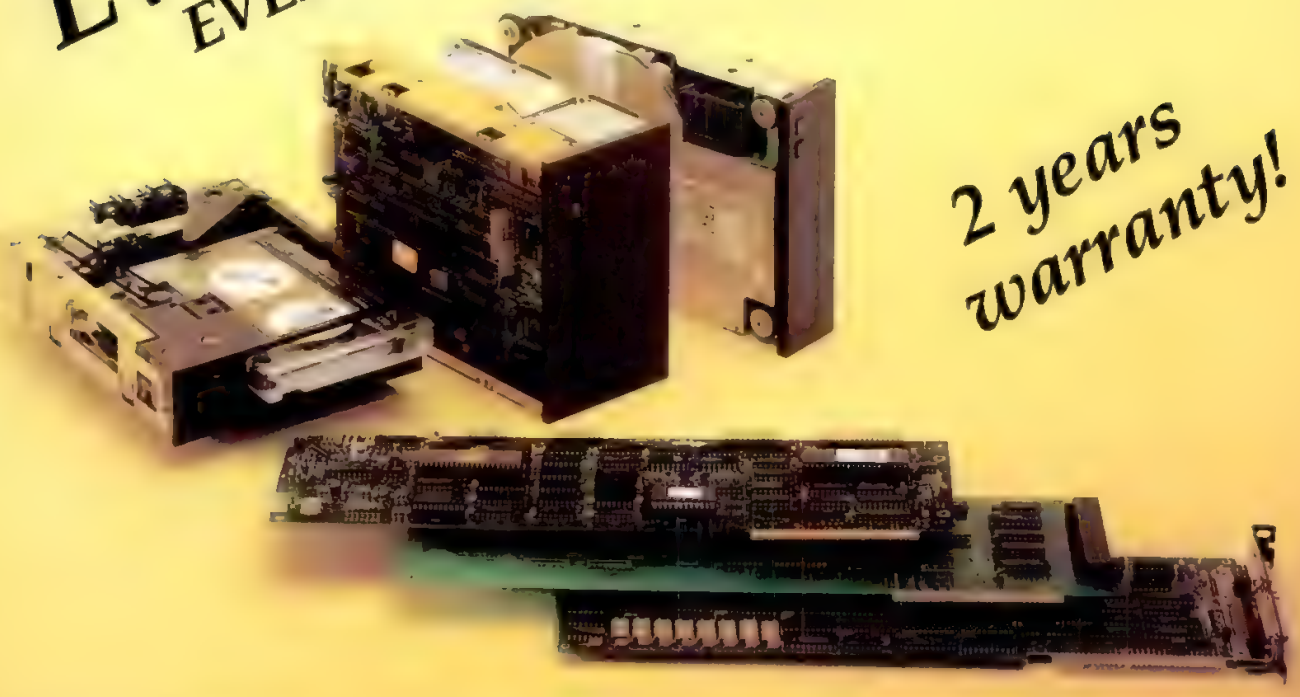
1011wreg data data-high*

*present only if w = 1

Let's analyze this. The first 4 digits, 1011, are binary for the hex number B. They account for the first digit of B9 0100. The w means "word" and represents a single bit that tells the 8088 whether it's supposed to be moving a byte or a word. If this bit is on (that is, set to 1), the item to be moved is a word. If it's off (cleared to 0), then the item is a byte.

How about "reg"? As you may have guessed, this stands for "register." If you look at the beginning of the chapter on instruction mnemonics in your *Macro Assembler* manual, you'll see a table showing the reg values for all the registers and their numbers. There are actually two

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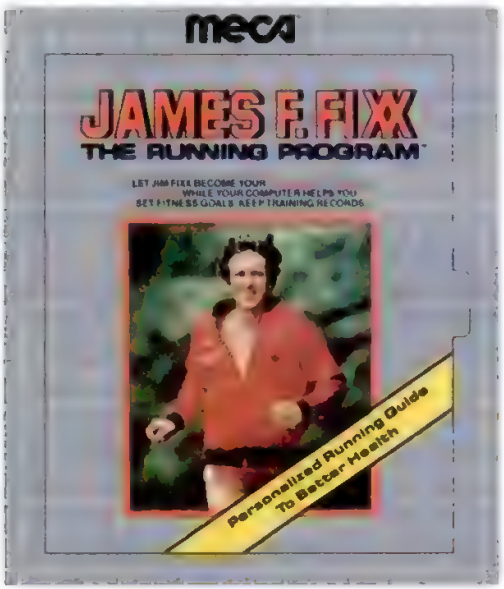
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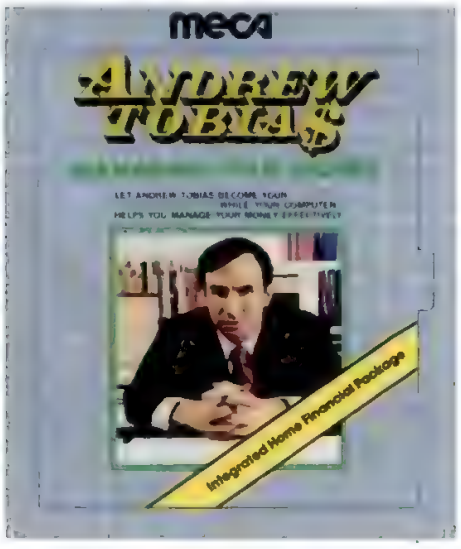
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tables, one for 8-bit registers (like CL), and one for 16-bit registers (like BX). Our instruction will put a word into the 16-bit register CX, so we want the 16-bit code for CX: the 3-digit binary number 001.

Putting all this together, we can now construct the first 2 digits of the op-code. Figure 14 shows how the hex number B90100 is constructed. Unfortunately, there are even more complicated examples.

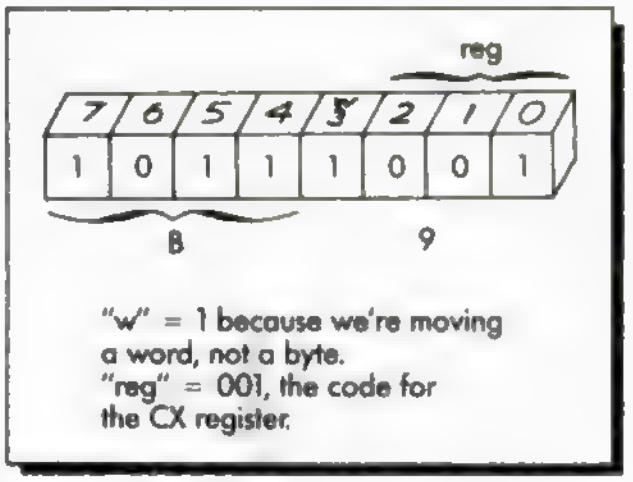


Figure 14: *Machine code of the MOV CX,0100 instruction showing the construction of the hex number B9.*

A More Complicated Example

When indirect addressing is used in an instruction, the calculation of the machine language op-code becomes somewhat more involved. Take for example the MOV DL, [BX] instruction at address 0106 of the PRINTHI2.COM program (see "Assembly Language: The Nature Of DOS," *PC*, Volume 3 Number 5). This instruction uses indirect addressing, signaled by the square brackets, to move the contents of the memory location contained in BX and place it in the DL register. The machine language equivalent of this instruction, as shown in the U listing for the PRINTHI2.COM program, is 8A17. Where do these numbers come from?

Again, look up the MOV instruction in the *Macro Assembler* manual. This time we want the section called

```
TO Register FROM Register

TO Register FROM Memory-or
Register Operand

TO Memory-or-Register
Operand FROM Register.
```

The encoding here is given as:

```
100010dl modregr/m addr-low*
     addr-high*
*these bytes omitted in
     register-to-register
     moves, etc.
```

Now if that doesn't look like an expression from genetic engineering, what does? Let's see if we can make sense of it.

Figure 15 shows what is meant by the various notations in the 2-byte form of this instruction. The addr-low and addr-high are not used in the particular case of MOV DL, [BX] because we are not using what is called the "displacement," which is simply an address like 0200 (or a label representing the address).

As you can see from Figure 15, the first 6 bits of the instruction are always the same. The next bit is the d bit, which stands for "direction." If d is 1, data go from memory to a register; if d is 0, data go from a register to memory. The manual uses the term EA to refer to memory. It stands for "effective address," which means the actual memory address where the data are to be placed (or taken from). This EA may be found by combining several different things, like a displacement, the number in BX, and the number in another register like SI. In our case the EA is simply the number in the BX register.

The w bit is 0 because we are dealing with a byte. (In our edition of the IBM *Macro Assembler* manual, there is a misprint for the value of this bit: It is shown as 1, instead of w, as it should be.)

The "mod" field is a new designation. "Mod" stands for modify and is used to indicate whether displacement fields are part of the instruction, and if so whether there will be high and low displacements or just low. We are not using displacements, so this field is set to 00. The various values of the mod field are listed at the beginning of the chapter on instruction mnemonics in the IBM *Macro Assembler* manual.

As for the "reg" field, in the case of the MOV DL, [BX] instruction, the code 010 indicates the DL register, since we are talking about 8-bit registers (as specified in the w bit).

Finally we have a new field, "r/m", which stands for "register/memory." The various values this field can take on are also listed at the start of the instruction mnemonics chapter of the manual. In our case r/m equals 111, which means EA equals [BX] plus displacement. Since we are not using a displacement (as indicated by the mod field), this can be interpreted as EA equals [BX].

Putting all these fields together in Figure 15, we arrive at the hex number 8A17 for the machine language translation of MOV DL, [BX]. The Macro Assembler has to figure out this kind of thing dozens of times a second.

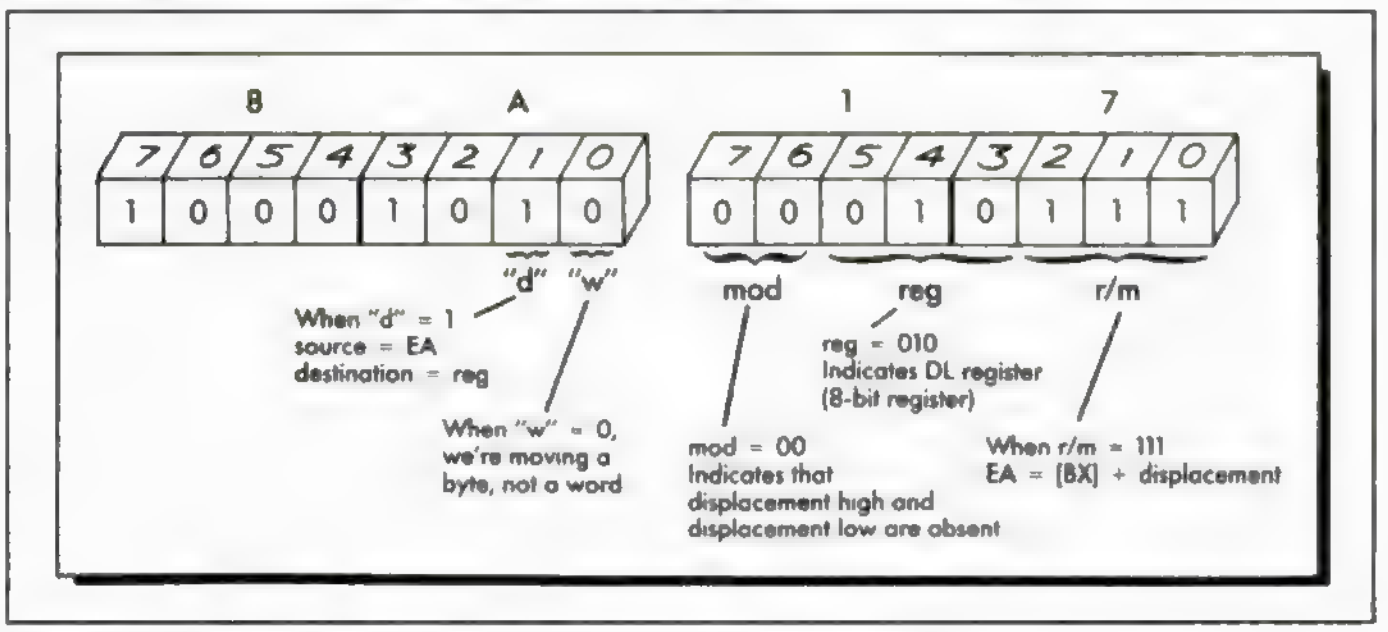


Figure 15: *Machine code of the MOV DL, [BX] instruction.*

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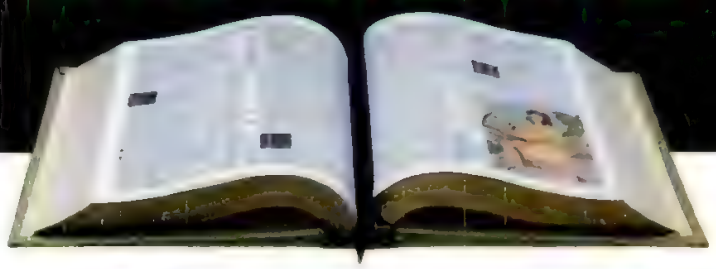
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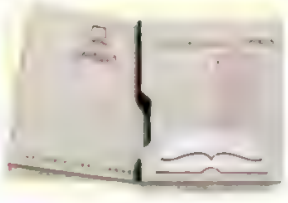
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Remember, you will very seldom need to go through this process—but if you do, you now know how to. For more detail on this topic, see *8088/8086 16-bit Microprocessor Primer* by Christopher L. Morgan and Mitchell Waite (New York: Byte/McGraw-Hill, 1982).

USING A BATCH FILE

We've assembled two programs, and the steps have been the same for both. We call up the assembler with our program name, and then hit the Enter key for the three questions the assembler asks. Then we do the same thing with the LINK program, and finally we call up EXE2BIN with the name of our program followed by the name of the resulting COM file.

All this typing can get pretty repetitious. Is there a way to automate it? The *batch-processing* feature of DOS is exactly what's called for here. (If you're unfamiliar with this DOS capability you should read about it in IBM's *Disk Operating System* manual.)

To use batch processing, you first create a file that contains a number of commands to DOS. When this file is executed, the commands will be carried out one after the other, quickly and without typing errors, while you sit back and relax.

The Command Line

Before you can create the appropriate batch file, you need to be aware that ASM (or MASM) can be operated in two different modes. In the mode you've been using so far, you simply type ASM followed by the name of the program. Then when the program starts to execute, it asks you questions about the names of the files you want generated (see Figure 16).

But there's another way to tell ASM what output files we want. We can enter all the information on the command line immediately following the name of the program we want to assemble (see Figure 17). This second mode comes in handy, since a command line such as the one in Figure 17 is a command to DOS and can therefore be executed in a batch file.

The LINK program, once loaded, also requires us to press Enter three times (see Figure 18). It entails a somewhat more complex approach in "command line" mode than ASM. Instead of putting the names of the output programs on the command line as we do with ASM, it's necessary to create a separate file called AUTOLINK that has no file extension and either put the names of the output files in it

```
A>asm happy2

The IBM Personal Computer Assembler
Version 1.00 (C)Copyright IBM Corp 1981

Object filename [HAPPY2.OBJ]:              <-- Press ENTER (or enter HAPPY2)
Source listing  [NUL.LST]:HAPPY2           <-- Press ENTER
Cross reference [NUL.CRF]:                 <-- Press ENTER
```

Figure 16: *When ASM executes, it asks you the names of the files you want generated.*

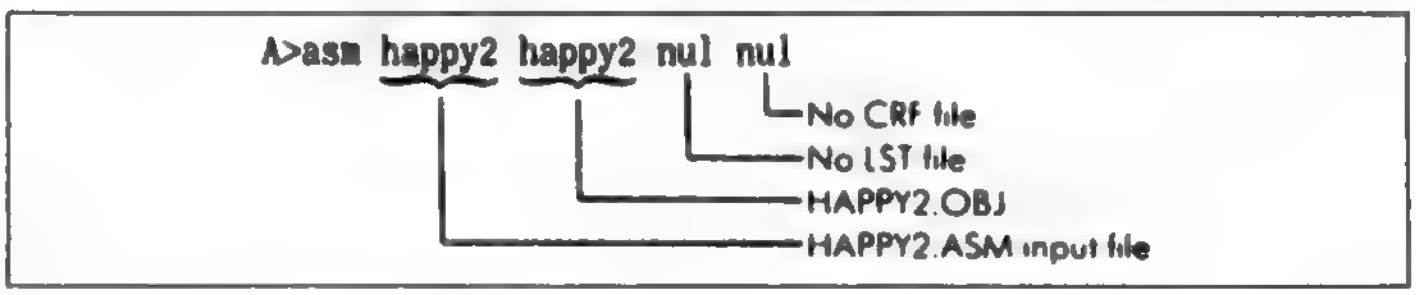


Figure 17: *The command line in ASM.*

```
A>link smascii

IBM Personal Computer Linker
Version 2.00 (C)Copyright IBM Corp 1981, 1982, 1983

Run File [SMASCII2.EXE]:       <-- Press ENTER
List File [NUL.MAP]:           <-- Press ENTER
Libraries [.LIB]:              <-- Press ENTER
Warning: No STACK segment

There was 1 error detected.
```

Figure 18: *Executing the LINK program.*

```
A>edlin autolink
End of input file
*1
     1:*
     2:
     3:        <-- Four carriage returns (Enter s)
     4:
*
```

Figure 19: *A file called AUTOLINK with four carriage returns.*

```
asm %1 %1 nul nul          <-- Create OBJ file with same name as ASM file
link %1 @autolink          <-- Create EXE file with same name as OBJ file
erase %1.bak               <-- Erase BAK file produced by word processor
erase %1.obj               <-- Erase OBJ file
exe2bin %1 %1.com          <-- Convert EXE file to COM file
erase %1.exe               <-- Erase EXE file
```

Figure 20: *A batch file that can turn an ASM file into an EXE file.*

or press Enter for the default values. For different uses of LINK, this AUTOLINK file can be very complex, but for our purposes, all we want to do is tell LINK to use the four default file names. We thus need a file called AUTOLINK with four carriage returns in it. EDLIN is perfect for creating such a file. Once created, the file looks like Figure 19 when we examine it again with EDLIN.

Creating Batch Files

Batch files use the notation %1, %2, and so on to refer to the file names typed in by the user when the batch file is executed. Let's take a look at Figure 20, a batch file we can use to turn an ASM file into an EXE file to get an idea how it works.

We create this batch file using EDLIN or a word processor, and we give it the name COMASM.BAT. (You can make up your own name, of course, but you must use the extension BAT.) In order to use this file, enter COMASM followed by the name of the ASM file that we want to automatically assemble, link, and convert into a COM file. For instance, to use this batch file on the SMASCII program, we would enter

```
A>comasm smascii
```

That's all we have to do. The COMASM batch file will take care of the entire process for us.

The first line of the batch file causes ASM to generate a SMASCII.OBJ file. The second line causes LINK to generate an EXE file. Now, our particular word processor program generates two files when we create a text file: The second is a backup file with the extension BAK. We want to get rid of this file to save space on the disk, so the next line erases SMASCII.BAK. We've already used the OBJ file, SMASCII.OBJ, so we erase that too, in the next line. The next to last line of the program tells EXE2BIN to convert SMASCII.EXE to SMASCII.COM, and finally we erase SMASCII.EXE.

When you start this process you'll have a single file, SMASCII.ASM. At the end of the process you'll have two files: SMASCII.ASM, and SMASCII.COM. All the intermediate files have been erased to save space on the disk.

We recommend you create your own batch file and use it for practice. The time saved will amply reward the effort. ■

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PCs in Pinstripes

Corporate America is making the IBM PC its desktop mascot and official office computer despite such snags as decentralization, lack of standardization, and MIS misery.

Imagine an immense office space—a blimp hangar peppered with filing cabinets and desks that extend into the haze. Now picture a PC sitting pretty on each one. Or maybe a skyscraper just after dark—some jarring rockpile foisted on the public retina by Philip Johnson—with an IBM PC monitor flickering in every window.

This is not an Orwellian vision, or even a moist Armonk dream. It is simply good business judgment being exercised by increasing numbers of this nation's most progressive companies. One of IBM's techniques is management by mission, and its microcomputer mission seems clear: to plop a beige PC or terminal on every desk in America.

This is hardly surprising. One of the trendier synonyms for small computer these days is "productivity tool," and it's no misnomer. The marriage of *VisiCalc* and Apple began rippling into corporate consciousness half a decade ago. Today, it's more like a tidal wave, with IBM, Lotus, and one or two others riding the big ones all the way in. There isn't a Fortune 1000 company out there that hasn't bought its couple dozen to play with, and a bold handful of companies are laying them in wall-to-wall.

Big Bluddites to the contrary, it's only a matter of time before IBM's plan comes true. What's the mystery? The PC is, after all, essentially a typewriter keyboard hitched up to an adding machine. The vaunted snail of an 8088 at the heart of the machine we all know and love is simply a third-generation calculator chip. How sophisticated does it have to be to move a few words around in memos, multiply a dozen spreadsheet cells together, or perform a slow string search across a hard disk?

Wearing Thin

Microcomputer crystal ball gazers don't have much to guess about. Hardware is getting faster and more powerful. Software is getting friendlier and more powerful. IBM is getting richer and more powerful. The mystique is just starting to wear thin. Put one computer in the middle of a crowded office and workers will

Illustration: Terry Allen



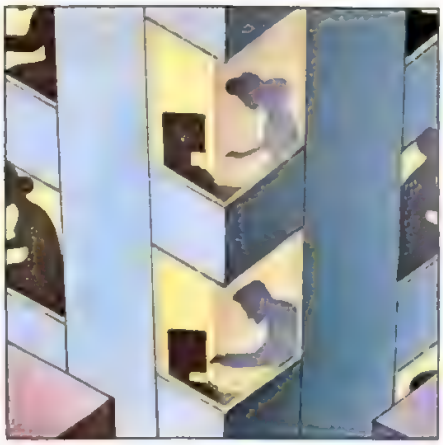
throng around it to see what it can do. But put one on every desk and after a week or two they're just furniture.

Any office that wasn't just wrenched from a dusty era of stand-up desks, celluloid collars, and quill pens no doubt already uses minicomputers or mainframes anyway. The real revolution is that now every executive's secretary or assistant bookkeeper can bang out in 20 minutes what once took a team of MIS specialists 2 days to accomplish.

And to the MIS executives making the purchasing decisions, IBM is not just a safe bet; it's a sure thing. Embroidered in many data processing managers' retirement plans is the golden phrase, "No one ever got fired for buying IBM." IBM, after all, does hammer together quality hardware. It stands behind its products with technical support and no-nonsense maintenance. It makes sure all its little computers can talk to its big ones.

MIS managers who once regarded themselves as guardians of inviolate data and high priests of technical arcana are being forced to take on the new role of nursemaid to the computer masses. Many of them are watching in horror as hundreds of executives armed with PCs and hard disks carve the central corporate database into chop suey. One of the more important duties of any large company's data processing manager these days is to sort out the chaos and make sure that newly harvested data makes its way from individual computers to the central mainframe, where it can be stored and shared.

Perhaps the biggest problem for companies taking the micro plunge is standardization. Computer purchasing decisions are often made at the divisional level rather than at the corporate apex, and it is common for several divisions within one company to buy utterly incompatible products. It's difficult enough when the New England office cranks out its forms using *MultiMate* and the California branches use *MelloWriter*; it's worse when one has IBM PCs and the other some out-of-date, hard-sectored CP/M mess.



Perhaps the biggest problem for companies taking the micro plunge is standardization.

There are dozens of headaches for companies stocking up on micros. How to train employees. How deeply to saturate the office, and on what basis to dole out available machines. How frequently to upgrade hardware and software. To network or not to network. Who should have access to what information, and how to prevent unauthorized snooping. How rigorously to police extracurricular computer activities. Should the company encourage or discourage home purchases. And finally, what to do with all the old Apples, TRS-80s, and worse that get the heave-ho once the PCs and Compaqs arrive.

There are two more very serious issues—compatibles and software. Is an IBM PC really worth a thousand bucks more than an ElectroLux that claims it runs most available MS-DOS packages? And should the company stick to the corporate software favorites *(1-2-3, MultiMate, Multiplan, dBASE II,* and *WordStar)* or standardize on some of the newer packages that scream in glossy ads about how they put the old standbys to shame? Deep down, doesn't every dollar-conscious MIS exec at least consider buying 2,000 PCs, one copy each of *WordStar, 1-2-3,* and *Disk Mechanic*—and a boxcar full of blank disks?

It doesn't take much arm-twisting to install PCs nowadays. Managers can easily measure increases in productivity and calculate how soon each unit will pay for itself. All but the most hidebound MIS managers are basking in the glow of new authority and respect. Prospective users simply have to watch old micro hands whiz through a spreadsheet in 30 seconds that would take 3 days on paper, juggle paragraphs and thoughts with awe-inspiring dexterity, or redesign a printed circuit or a left-handed flange lickety-split, and they're sold. When you toss in instant access to a central company database and the joys of circumventing the U.S. Post Office with electronic mail, how could anyone say no?

We spoke with some of the nation's most extensive users of PCs to see how they were addressing these problems and whether they were pleased with their hefty purchases. Without exception, the companies we contacted were delighted with their PCs and were planning to expand the range of their microcomputer applications. If their experiences are typical, it won't be long before small computers grace every corporate desk.

A Little Traveling Music

Perhaps the biggest corporate user of PCs is the Travelers Insurance Company. Several months ago, the trade press erupted in an orgy of awe over this company's reputed purchase of 12,000 IBM Personal Computers, as if this event signified premature entry into the next millennium.

Travelers is one of a handful of PC-heavy insurance and high-technology corporations based in Hartford, Connecticut, which must be the small business computer nexus of the universe. Insurance companies are perfect microcomputer customers, churning out boxcars of forms daily and massaging vast actuarial databases. High-tech firms employ cadres of engi-

neers and designers whose lives revolve around the floating-point magic of the 8087 chip.

Travelers has 2,000 IBM PCs already in place. Travelers executive Ronald F. Larity refused to be pinned down on the actual quantity ordered for the future and hinted that the number may not be as substantial as the leering press reports indicated.

In the spring of 1982, the Travelers' DP department acknowledged that the PC was a "viable product" for its particular operation. Back then, it had a mixture of Apples, HPs, and TRS-80 Model 100s. The DP department felt it needed formal guidelines on which machines the company would want to live with and concluded that in the future the company would support only Apples and IBMs. The choice was left up to the user. In 1982, employees overwhelmingly preferred Apples. Since that time, however, the company hasn't purchased any new Apple computers. This wasn't a management decision, according to Larity; it was the employees themselves who made the choice.

Wrestling with New Products

In 1982, Travelers was using four or five different word processing products and *VisiCalc*. "We had the same kind of growing pains as the rest of the industry," Larity explains. "We began without any standardization and had many kinds of hardware devices and software products. Even now, a large part of our job is wrestling with the growing number of new products." Today the company relies almost totally on *1-2-3*, *MultiMate*, and *dBASE II*, and it has just approved the use of *PC Focus*, a fourth-generation high-level mainframe data manipulation product.

Travelers is also beginning to exploit the micro-mainframe link in earnest and plans to use the PC as part of its traditional data processing networking capability. It is also looking into program development on the PC. Explains Larity, "We're trying to understand the trade-offs and productivity gains in developing software internally with COBOL on the PC versus IBM's TSO (Time Sharing Option) development system. We've also developed some very good quality BASIC language programs for use in branch offices. We chose BASIC because it comes with every IBM PC, which means we can send it anywhere and have it run without any special software."

The company operates its own internal "Travelers Computer Store," where users or prospective users can sit down and get to know the hardware and software. Its managers claim the tutorials in the better products are good enough to teach most people, but they are on call to fill in the gaps. Travelers feels that the answer is not in better training but in developing hardware and software that doesn't require much training time.

> High-tech firms employ cadres of engineers whose lives revolve around the 8087 chip.

The eventual goal, according to Larity, is to put the personal computer into the mainstream. "Anyone who becomes more conversant with the technology is more valuable to Travelers. We will have an employees purchase program, though there isn't one in place yet."

Another goal, he says, "is to redistribute products we've already purchased that may not be as flashy or powerful as some of the newer software but that still have a legitimate use. We don't want *VisiCalc* to be used in just one way, for instance. We want it to be recycled. There are faster and more powerful spreadsheets on the market, but not every user needs all that power and speed.

"We're still at the point on the curve where commercial software offers a significant return without any investment for development on our part. Instead of saying 'Why don't we write our own Travelers-specific version of *1-2-3*, we think about using *1-2-3*' for those things that would make sense and then offering other office software that could be used with it."

Scrapping Apples?

United Technologies, a diversified high-technology company in Hartford, has close to 2,000 personal computers for its 180,000 employees. They include Apples, HPs, and TRS-80s, but well over half of them are IBMs.

The corporation, like many of its size, is not structured so that one brand of equipment can easily be standardized across the board. Each operating unit imposes its own standards, and the selection is up to the division manager. Top management feels that if a division has already standardized on Apples or Radio Shacks, it wouldn't make sense to scrap them all and purchase IBM equipment.

While some larger companies deal directly with the national sales arms of hardware and software manufacturers, United Technologies doesn't. According to company spokesman Dr. John Bennet, "United Technologies buys most of its PCs from stores rather than directly from the vendor. Stores seem to be more ready and willing to offer support."

The company's employees use their computers primarily for spreadsheets, list processing, and simple presentation graphics. Software selection is left up to the users. Executives get free copies of *Context MBA*, but some have switched to *1-2-3*. "We're finding that executives use word processors far more than they thought they would. Word processors are good for people who aren't very good typists. They make it possible to send messages on the mail system or prepare rough drafts for secretaries. However, there is still a reluctance on the part of some executives to type, so one division that hadn't installed any word processors decided to give all the executives' secretaries IBM PCs with *MultiMate*. And several divisions are starting to hook up mail sys-

tems," reports Bennet.

No executive is forced to use a PC—and several have indicated that they really didn't want one. But most are eager to acquire them. One nagging problem is that some "fall in love with their computers" and flood the data processing departments with requests for state-of-the-art software, hardware, and printers. Some engineers also use PCs, but more are accustomed to the 3270s and 3278s that have been on their desk for some time.

MISsing the Point

United Technologies' corporate micro training program has graduated over 1,100 IBM PC-trained executives. The large number of people puts a strain on the data processing support. In the old days, MIS managers had to support only the financial services department. Now they have to support large numbers of individual users doing all kinds of different tasks with all kinds of software. They are gradually developing a system that gives users access to support through educational programs in the different divisions.

In a large company, according to Bennet, there are two distinct types of MIS executives. Some have made a lot of progress in keeping ahead of this particular phase of the computer revolution and are applying the technology. Others resist personal computers every step of the way. There are many problems in MIS departments. One is the changing role of the MIS manager—from guardian of the centralized data to mother hen. Another is sorting out files produced by dozens of incompatible software and hardware products. Then there's the nightmare of individual databases. A company can start out with one orderly, centralized bank of information, but by the time it is manipulated on hundreds of different PCs, the results can be chaotic. The answer at United Technologies is a sort of data stratification. Centralized data is maintained in the central mainframe computer, departmental data is stored in each department's minicomputer, and only personal data is kept in micros on employees' desks.



Connecticut Mutual's microcomputer network, in existence since 1971, links its 86 sales offices.

The company is just beginning to measure productivity increases, but Bennet feels there are far more benefits than problems. "People are making major changes in the way their offices are structured. It's far easier for everyone if the department managers know what computers are all about. Eventually they're all going to have to live with workstations or terminals.

"Quite a few of our executives' computers are at home. We don't encourage employees to buy their own machines as much as they'd like. Apple gives them good discounts. IBM, on the other hand, requires that companies buy them and then resell them to employees. While it's just a matter of shuffling paper, with the paper comes some responsibility. Still, we get another 2 hours of work out of executives who have computers in their homes. We even have one employee—a super programmer—who works exclusively out of his home. His office is in Connecticut, and he lives in Washington state—all he really needs to do his job is a terminal."

Connecticut Mutual Life, another pillar of Hartford, has 1,250 personal computers, all from IBM. It decided to standardize on PCs after numerous requests from employees who were trying to work with everything from Compaqs to Commodores.

Sixteen-Bit Hunch

The company decided to buy IBM PCs in August, 1981—the month the machines were originally announced. Shortly after that, it signed a contract for delivery of 1,000 units and became, according to company vice president William Dowty, IBM's first corporate client. Before it made this purchase, the company had been experimenting with hooking up 8-bit machines to its telecommunications network, but these small computers kept dropping bits. When IBM announced its 16-bit machine, the company "intuitively" felt the data transmission problem would vanish—and the hunch proved correct.

Connecticut Mutual's microcomputer network, in existence since 1971, links its 86 sales offices. Every office has between two and 15 PCs, which employees use to generate bills, assemble sales pitches, and transmit information to the central office on things like changes in beneficiaries and addresses. "We keep the network of PCs separate from the normal data processing environment, where we do everything by the numbers and have very strict operating controls," Dowty says. "The MIS director must approve all software and hardware, and he is careful to maintain his position of leadership so that all employees in the company come to him when they need hardware or software. He has an introductory videotape that introduces employees to computers so they're not scared to death. We also offer on-site training through our information center and encourage employees to visit the center before they get a PC."

When the PC was first introduced, there were few word processing packages available, and executives at Connecticut Mutual weren't happy with any of them. At the time, Will Jones, the head of Soft-

Word Systems, Inc., happened to be doing consulting work for Connecticut Mutual on an unrelated project. Jones heard about the predicament, told company executives that he knew exactly what they needed, worked out a set of software specs, and delivered an initial beta test version 90 days later. Jones retained the rights to the package and sold it under the name *MultiMate*. Connecticut Mutual was extremely pleased with it and so are many of the country's largest corporations.

Dowty doubts that there will ever be a workstation on every desk, but believes a ratio of 2 to 1 is certainly a possibility. "If you include PCs and other terminals, we're already at that point. We probably won't run out this year and buy lots more PCs. Instead, we'll be watching to see what happens with the PC*jr* and the anticipated battery-operated IBM portable. An executive may have a PC*jr* at home and a PC or a terminal here, or a PC at home and a terminal here. Of the PCs in the field, 700 have been purchased by our agents for their own use. We do have an employee purchase plan."

Is Connecticut Mutual pleased with its PCs? Dowty points out that while the company has never done a formal study of how its PCs have increased productivity, there was a 24 percent increase in sales the first full year the computers were installed in the field offices. His guess is that this was more than just a coincidence.

Eagle Calling

Avon Cosmetics Company didn't call on IBM but on Eagle. The company currently owns 250 Eagles for its 30,000 employees. Although it also owns a handful of Apples and IBM PCs, Avon purchased Eagles rather than PCs because, according to spokesman Harry Mah, the company believes that from a price/performance standpoint, Eagles are better than IBMs. They cost half as much and run all the IBM software Avon has tried.

While the Eagles are used primarily as spreadsheets, database managers, and word processors, Avon's plan is to "migrate the use of intelligent workstations into an office automation network that will handle all electronic mail, calendaring, and scheduling—all the customary electronic office functions." Avon uses its IBM PCs at present to hook into mainframes, emulating 3278s using Peacock boards.



Avon's plan is to migrate intelligent workstations into an office automation network.

Avon is preparing for a very big project in the next year and a half, and has just agreed to purchase 3,000 unspecified microcomputers for this operation. When a company purchases a very large number of microcomputers, according to Mah, it can expect to receive discounts of between 30 and 50 percent directly from the manufacturer.

Avon employees who want computers have to justify them on productivity/cost/benefit grounds. Data processing managers surveyed the initial base of users to study what workers were doing with their computers, and discovered that on the whole, desktops were substantially increasing productivity. Only a very small number of employees weren't using their computers effectively, and these the managers retrieved and placed elsewhere—there is a big demand for them. Some Avon employees also have PCs at home; like most companies with a large number of personal computers, Avon has an employee purchase program.

Back in 1983, Avon sponsored an internal Technology Fair and invited 23 vendors to demonstrate their equipment to curious employees. Many employees who attended expressed interest in learning more about computers, so the corporation created a "Computer Learning Center" and chartered a new management section, the "Personal Computing Group," to support it. The center has 20 micros on display, and all employees are invited to visit and learn how to work with them for both home and office use. Over 600 employees have undergone training there.

"After people come through the learning center, they usually go back to their departments and talk to their managers, and before we know it they order computers for their departments," Mah explained. Some workers use modems from their homes to access the company mainframes; some bring in disks. Avon provides and supports modems and anything else that employees need.

The Computer Learning Center's focus is on using PCs and time-sharing systems to meet all the company's information needs. Avon holds seminars and conferences at its New York headquarters, where it flies employees from distributing and manufacturing locations from all over the United States and teaches them how best to use micros. These visiting employees also learn how to set up computer learning centers at their own locations—there are now centers at all seven national offices. Avon is expanding its educational programs to its 30 international locations in Europe, Asia, and Latin America, where it runs a variety of IBM, Eagle, Apple, and DEC microcomputers.

"Our goal is to provide an intelligent workstation at every professional's desk," says Mah. Each will have independent data processing power and the capability to connect to Avon's electronic automated

office functions using DEC's ALL-IN-ONE system. They'll also have the ability to hook into Avon's Burroughs time-sharing computer; the IBM production computers that run manufacturing, inventory, sales, and billing; and the company's DEC and PRIME minis.

Avon runs a parallel program that provides PCs to its many systems programmers, who develop COBOL programs to run the company's mainframe operations. This minimizes the work load on the company's IBM development computers, prolonging the life of Avon's larger IBM 4341s.

Swapping Keyboards

The results are beginning to pay off handsomely. One employee developed a program at home on a PC to improve order flow processing in Avon's distribution centers. This program saved the company $100,000 annually and was installed in all distributing centers in the country. As a reward, Avon gave this employee a free personal computer.

When another employee developed the first part of an executive information system that would allow top echelon personnel to connect their PCs to Avon's time-sharing system and get key information regarding the operation of the company, Avon was delighted and offered him a computer as a gift. "He said no, he wanted a piano instead," Mah recounts. "He didn't want a computer at home because he had enough. The fellow had spent several hundred hours at home on his own time developing the system."

The Jet Propulsion Laboratory (JPL) in Pasadena, California, has approximately 800 microcomputers, including 50 IBM PCs that it acquired within the last 3 months. By the end of 1985 it expects to have 1,000 IBM PCs. JPL also has 10 Compaqs, a few Coronas, and 400 Otronas, and it runs 175 multiuser Z-80-based Automated Office Data Center (AODC) micros that were designed in-house.

JPL initially bought the Otrona because it was compatible with existing AODC files. When the IBM PC was announced, the company altered its computing direction to be PC-compatible. Otrona then upgraded its Attaché to be compatible with the PC, and JPL immediately purchased another 100 Attachés. The Otrona contains both a Z-80 and an 8-MHz 8086 processor and represents the best of both worlds, according to JPL spokesman Jim Jacobson.

> One Avon employee developed a program at home on a PC to improve order flow processing.

JPL has designed and is installing its own local area network and will be networking all its micros with its many mainframes. The micros are used primarily for word processing, database management, and spreadsheets, and as industrial controllers to run test equipment and monitor incoming data. The company is making a big effort right now to switch everything from CP/M to MS-DOS.

There was an unanticipated bonus to the increased emphasis on micros. Wayne Ratliff is said to have developed *dBASE II* while working at JPL, as a spinoff of JPL's proprietary Data Information System, (DIS). As a result, when *dBASE II* was released, JPL scientists found that all their files were instantly compatible.

Martin Marietta Data Systems, another diversified high-tech firm, gets double the usual mileage out of its PCs. Last spring the corporation acquired a Princeton, New Jersey, software producer called Mathematica and renamed it ITSoftware. Part of ITSoftware's function was to coordinate all PC use, maintenance, and training within Martin Marietta. Another ITSoftware branch was tapped to develop a commercial series of integrated microcomputer packages, from databases to spreadsheets to statistical and communication packages. Martin Marietta originally decided to acquire Mathematica because it wanted the rights to Ramis II, a nonprocedural language mainframe database management system.

The Martin Marietta micro products center distributes small computer hardware and software to all parts of the corporation. The biggest single user is the aerospace division, with an installed base of 500 computers.

Reports Martin Marietta executive Dr. Norm Agin, "We picked IBM PCs for compatibility with mainframes. We have a long working relationship with IBM and run a large IBM mainframe shop." Most of the company's PCs and PC-XTs are in the hands of administrative and financial personnel. Martin Marietta also owns a smaller number of Coronas, which it purchased because of the tight IBM PC supply. Agin anticipates acquiring 40 to 50 new PCs each month for the foreseeable future.

The Right Touch

Martin Marietta has installed IRMA boards in many of the PCs and is experimenting with electronic mail. The company is also a big user of IBM's Professional Office Systems (PROFS) mainframe electronic mail network. With 3278 emulators, users can work on their PCs and upload their files to the mainframe for distribution to others. Agin scoffs at the notion that putting in PCs reduces the load on the company mainframe. "We haven't seen this happen, and it's not a justification for installing micros. However, there is a marked productivity increase overall when micros are installed."

Agin thinks there will soon be a PC on every desk in America that currently has a typewriter or calculator, but adds, "This doesn't mean computers will be as ubiquitous as many people predict. After all, we don't have typewriters and calculators on every desk now. The PC of the future will be a different machine—or series of

machines. They'll range from low-cost, novice-user machines to far more powerful ones than we have now. In 5 years they'll be in most executives' hands."

What kinds of changes does Agin think we'll see? "First, a wider use of touch screens in a few years. Voice recognition is still pretty far off. What will be perhaps most important is a natural language interface. Users should be able to type in, 'Who is our largest competitor?' and get an answer. Touch screens and natural language/AI will be the big thing for the next 5 years, and voice recognition in the 5 years after that. And we'll do just as well as the Japanese in these areas."

He argues that the software also needs to be improved. "Right now the most popular kinds of programs seem to be integrated packages built around calc programs rather than database managers," Agin observes. "We see an enormous amount of routine data processing on micros being inappropriately done on calc programs. We think the core of such integrated packages should be a good database management system—one that manages your files and data and interfaces to word processing, graphics, and everything else." Martin Marietta's IT series was designed with this goal in mind.

While MIS executives in many companies are looking at IBM's XT/370, Agin is not sanguine about this high-priced hardware. "It's a smart move on the part of IBM, but not for us. If I wanted to run mainframe software on my desktop 2 or 3 years ago, I would have gotten a 3278 terminal for $2,500. Now, several years later, with enormous improvements in hardware and technology, I can pay $12,000 for an XT/370, and IBM tells me this machine will run about six times slower than the 3278. So what's the advantage? To us, nothing. To IBM, however, there's a tremendous advantage—instead of getting $2,500 it now gets $12,000."

Banking on PCs

Citicorp uses its 5,000 PCs in its offices nationwide in an increasing variety of ways, according to executive Fred Lewis. "Once you get used to them you can figure out lots of applications. We didn't start out to have a PC on every desk but it's very close to that now. The IBM box is extremely versatile. I don't want to sell IBM PCs, but that particular unit has a tremendous amount of capability, from talking to mainframes, to general office and accounting work, to acting as an electronic mail station."

There was some initial employee resistance at Citicorp when the micros were first introduced, but once the data processing staff demonstrated the usefulness of the PC and some of its more powerful applications, "it just took off," says Lewis. "The best salesman is the office worker next to you. Office workers see other workers pecking away and start asking questions, and before you know it, everybody wants one." Microcomputers are now such a fundamental part of the Citicorp operation that, in Lewis' words, "the mystique is starting to vanish. PCs are now as necessary and common in our offices as typewriters. It has gotten to the point where you can give an engineer a PC, and he'll let you take his desk or drafting table away."

Electronic mail is becoming increasingly important to Citicorp because it speeds up the communications process, saves the company money, and increases everyday productivity, claims Lewis. Authors can type in text, push a button, and have copies anywhere in the country instantly. Because it is interactive, it boasts a substantial advantage over facsimile machine transmission. Two executives can author the same document from across the country.

The explosion of PCs was a real threat to MIS managers at Citicorp. But, Lewis points out, "There is still a need for mainframes. Total decentralization would cause terrible confusion, especially when users have hard disks and can maintain their own complex records. These records should be centralized at the mainframe level." Norm Agin of Martin Marietta agrees and predicts that there will be a new role for mainframe MIS managers—to implement strict controls and to prevent chaos from taking over.



Office workers see other workers pecking away, start asking questions, and before you know it, everybody wants one.

The benefits far overshadow the temporary inconveniences. "We intend to double the size of the company purchase program by next year," crows Lewis. "We thought that after the initial surge of interest, the demand would taper off, but the demand is actually at a far higher level than anyone expected."

Sit by Nellie

The Equitable Life Assurance Society owns approximately 300 PCs, one for about every three to five workers. These days, rather than buy Wang terminals to hook up to the company's large Wang, it purchases Wang PCs. But Equitable has more IBM PCs than any other brand of micro.

Equitable purchased its first small com-

puters because of *VisiCalc*. Initially the company standardized on Apples, but when the IBM announced its entry, it moved to IBM PCs, because, according to Equitable vice president John Gosden, "they were the most compatible wave of the future." Equitable will change the focus of its standardization only when its managers perceive a significant difference in performance—from *VisiCalc* to *1-2-3*, for instance.

Two years ago, corporate MIS executives began to recognize how useful micros could be and ran a campaign to pass this information along to the Equitable employees. They demonstrated and loaned machines and spread the word using what they termed the "sit by Nellie" technique. They would find workers who were curious and seat them next to seasoned PC users. This technique also worked when employees had trouble learning how to operate specific software packages. Experienced users were happy to pass along tips and teach the uninitiated the ropes.

According to Gosden, the early machines paid for themselves in increased productivity in less than 3 months. After that, the MIS staff made a concerted effort to "infect" the building with enthusiasm for micros. "It was interesting to watch the fever work its way through the company. We would help people in many ways, especially newcomers. We even produced some demo tapes of our own and found some software that was good for training."

Gosden asserts that by 1986 everybody in the building will have a terminal of some type, from simple query access to very powerful machines, and adds that this prediction isn't really very surprising: "Everyone has a terminal on his desk right now. It's called a telephone."

PCs are not simply word processing and spreadsheet workhorses; they are becoming increasingly popular wherever information has to be shuttled across large distances. As reported in a recent issue of *PC* (see "Checking Inns With The PC," *PC*, Volume 3 Number 5), Ramada Inns uses 635 IBM PCs in its hotels as reservation computers. (Of course, Ramada is not immune to the lure of increased individual productivity; it also uses several dozen PCs at its Phoenix headquarters for investment analysis and forecasting, project scheduling, budgeting, word processing,

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and other standard office functions.) In Ramada's Las Vegas casinos, PCs are used to analyze everything from the profitability of specific dinner menus to what happens to slot machine traffic when tourist buses arrive. They even keep track of big spenders' favorite drinks.

There are over 300 terminals at the company's Phoenix headquarters, one for every two employees. By the end of the decade there will be one personal computer on every desk. While Ramada currently uses many 3270s and DEC VT-100s, it selected PCs because company managers felt IBM was the standard in the industry. However, Ramada is also evaluating PC compatibles for price and the ability to outperform the PC.

Ripping off Doors

Executives at Ramada are delighted at how well the PC program is working, but they acknowledge that there are problems. The most serious one to date? Hotel employees rip the doors off the disk drives trying to remove floppies.

Companies nationwide are choosing IBM PCs and PC compatibles. Ford Motor Company, which until now has relied primarily on Victors and TRS-80s, will be buying several hundred PCs this year. As Ford executive Mayford Roark puts it: "Many managers feel the PC is the safest micro to buy; it handles mainframe communication needs best and will have the longest life of any of the personal computers now on the market."

Apple is making one last play at snatching back a chunk of the business market with its new family of 32- and 16-bit micros such as the Lisa. Whether it succeeds largely depends on how soon IBM announces its own souped-up PCs. But as far as many observers are concerned, there's no contest. IBM will dominate the corporate small computer market just as it did with electric typewriters. Before long, people will scratch their heads and wonder why there was so much fuss over the three-initial fixtures that sit on every desk in every office in America. ■

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APPLICATIONS/NAT SAKOWSKI AND LESLIE BAKER

Will Middle Management Survive the PC?

As microcomputers become more common in the business environment, their effect on managers and management style becomes an increasingly important question.

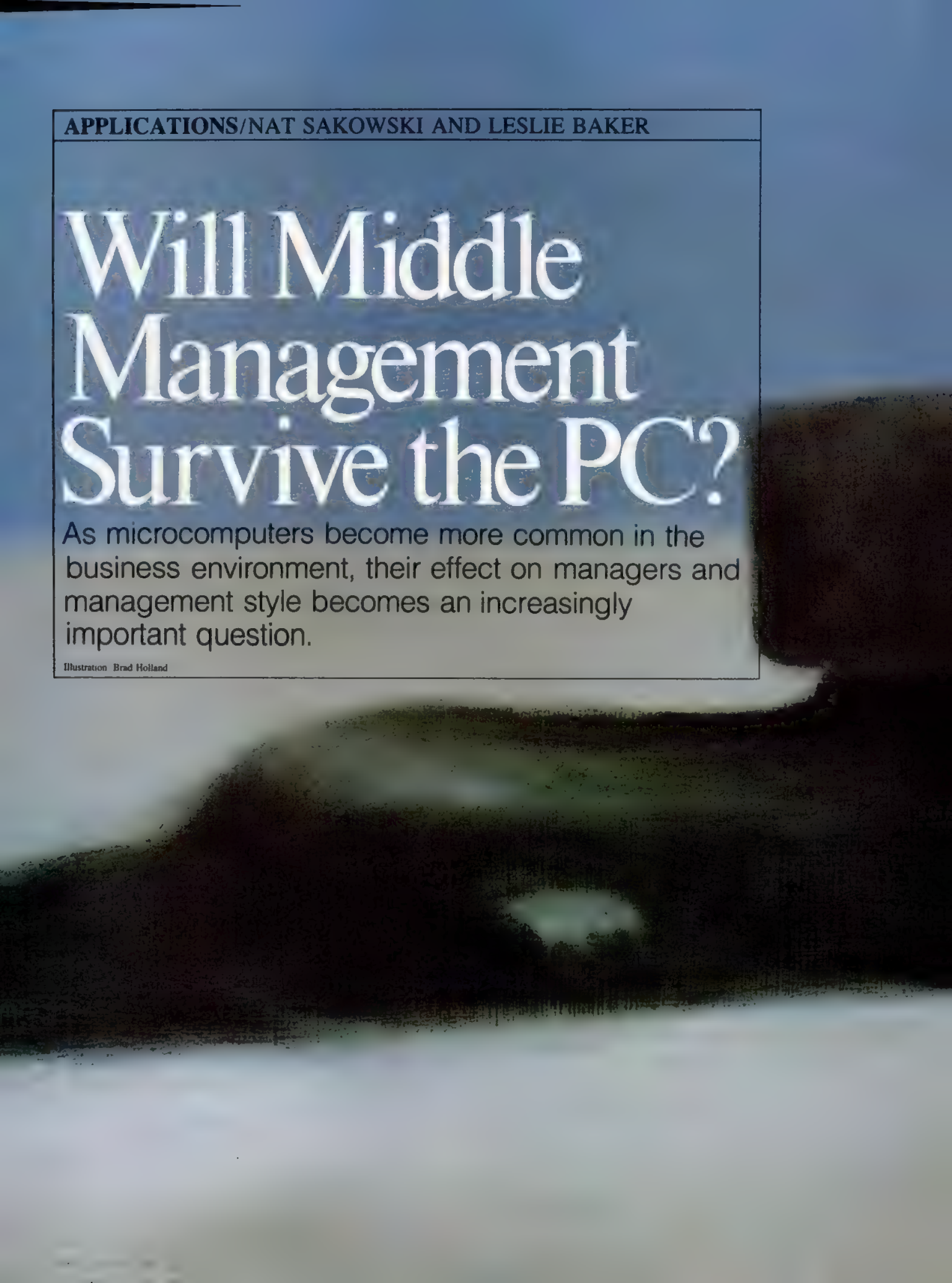


Illustration Brad Holland



In 1958, 17 years before the first microcomputer hit the market, an article in the *Harvard Business Review* predicted the demise of the middle manager—and claimed the computer would be the culprit. The article, written by Harold Leavitt, Professor of Organizational Behavior and Psychology at the Graduate School of Business, Stanford University, and an acknowledged expert on corporate management, prophesied that computers would dramatically alter the way American corporations were managed.

The article theorized that power, control, and innovation would shift away from middle managers as increasingly sophisticated computer systems provided information directly to top executives. Since intermediaries would no longer be needed to interpret data and make functional decisions, hundreds of thousands of middle management jobs would be eliminated. Top executives, with the help of indispensable data-processing professionals, would rule a squatter pyramid—the thinned ranks of middle managers forming just one shallow layer above the army of hourly workers at its base.

But here we are in 1984, and middle management is very much alive and well in corporate America. IBM will ship 2 million PCs this year, and most of them will land on the desks of corporate managers—low, middle, *and* high. What skewed the prediction?

Says Leavitt now, "One sizable factor nobody could foresee in 1958 was the trend toward miniaturization. Who could have dreamed that the microchip would come along? In those days, decision-support systems were highly specialized computers costing hundreds of thousands of dollars. Only the larger corporations could even contemplate installing one of these machines, which required the services of a large and highly trained data-processing staff. That was the reality of computing then, and that's what my vision of management changes was based on."

The introduction of personal computers has opened up new opportunities for both middle and upper management. "Today, personal computers are giving top managers more choices about how they want to operate and control their companies," says Leavitt. "An executive now has the choice of getting on-line himself, or delegating the task to a senior adviser who reports to him."

Top Brass and Middle Managers

One CEO who chooses to go on-line is Ben Heineman, the president of Northwest Industries, a banking and financial services conglomerate. Heineman is a top executive who likes to "get his hands dirty in the data." Sitting at the controls of a $2.9-billion corporation consisting of nine operating companies, Heineman gets personally involved in the functional details through a computerized executive-support system. He claims this system lets him ask the right questions and try out various "what-if" projections.

Northwest Industries' computerized executive-support system contains 350 financial and operational items on the planned, budgeted, and actual monthly results of each operating company for the past 8 years. It also provides forecasts for the next 4 years. The system can retrieve and generate reports on compound growth, variance, and trend analysis; generate 45 key economic ratios; communicate with many external databases; and manipulate and display data in graphic form for statistical and forecasting uses.

Heineman works on the system daily to extend its capabilities. He writes programs on it using a high-level language called EXPRESS that contains simple file-handling and data-collection routines.

In 1976, Heineman's enthusiasm encouraged the six executives under his supervision to become active in building and using the executive-support system. An active training program was set up to help middle managers use computers in their decision-making processes. Since then, the system has spread to middle managers throughout the corporation.

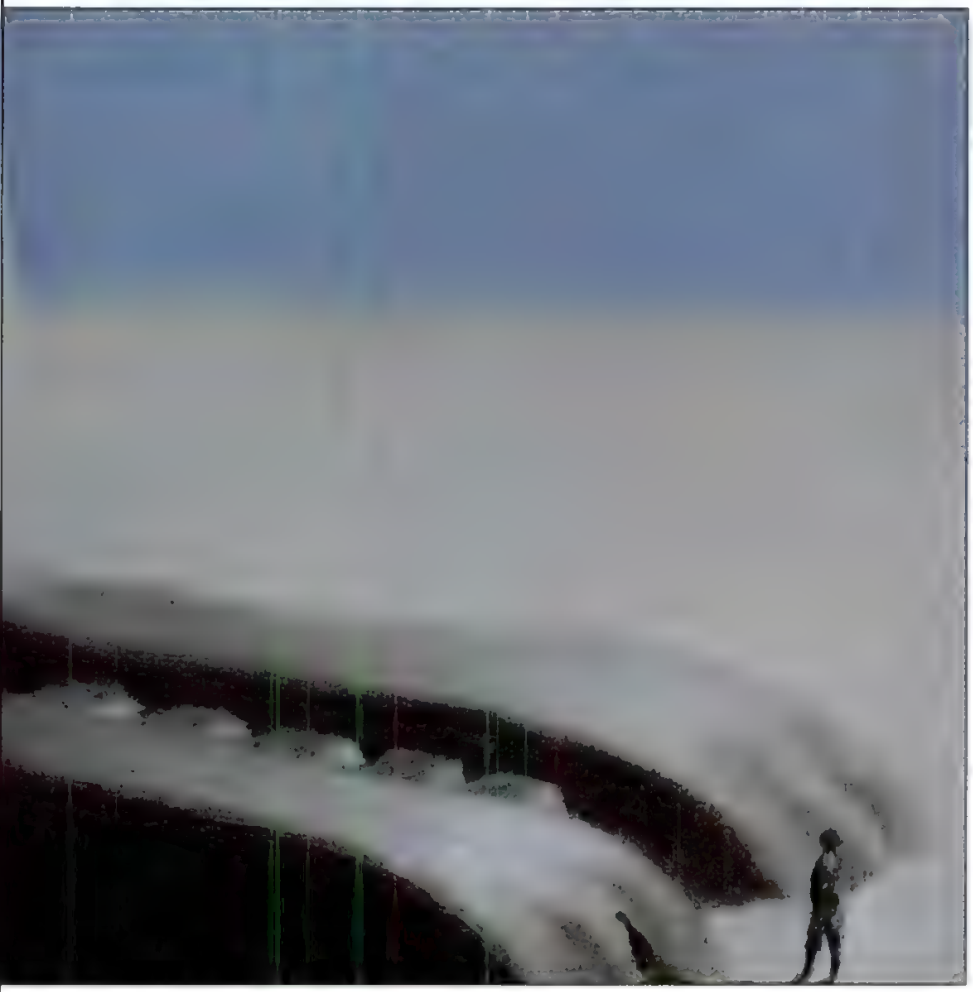
The personal computer era has produced a new type of middle manager who is comfortable with the emerging technology and the new management practices it fosters. John Craig is a model of this type



of middle manager. Craig works for a major oil company based in Chicago. After 9 years in the company's data-processing department, he used his ability to program a personal computer to make his move into management. One day over lunch, a marketing director complained about the amount of time it took to get information back from data processing. Craig suggested that the marketing department form its own database on a PC.

The department's activity involved buying crude oil and selling it to hundreds of small, widely dispersed companies that converted it into products other than fuel.

Craig set up a relational database system using *dBASE II* that helped reduce the amount of paperwork and time spent waiting for third parties to process information. Data gathering and analysis became



focused in one spot. End users could be grouped by key factors: geographical, amounts purchased, seasonal needs, type of crude purchased.

Craig's knowledge of computers advanced his career. It provided job security as well, since he was the only one who knew how to access the database.

Management Style

Joe Ferrara, a vice-president with the DiBold Group, a management consulting firm, thinks it is still early to draw dramatic conclusions about how the PC will alter management styles in large companies. "I can prognosticate about what putting 3,000 PCs in the hands of different managers in different departments of big corporations will do to the power structure of that corporation," he says. "But I try to keep myself from getting too excited about the introduction of a new technology into a complicated, corporate environment. I've been through all the hoopla about the automated office—I don't think the productive results have been all that great.

"Every corporation has its own culture," he continues. "And a lot of emotional attitudes are set by the top guys. If a corporate head signals that he is in favor of acquiring more computers and gives the okay to training and support, then middle managers will interpret his attitude as a sign of the times, not to be ignored. They'll try to impress him with their newly found computer knowledge.

"On the other hand, the men at the top of corporations got there through drive, ambition, knowing themselves, and developing an information network that works for them. That information network may be informal: perhaps they go to lunch with people who keep them in touch with key elements in their industry, or they read trade papers, or they have trusted middle managers they have groomed over the years to keep them on top of situations. I respect the fact that whatever they have going now works for them. And I won't meddle with it. Not everybody has to be on a terminal."

Ferrara thinks the impact of computers varies from industry to industry. "In the service industries, personal computers are just fantastic. My brother-in-law is a broker. He was able to cut his staff down by two when he installed two PCs. He now does 50 percent more business with 20 percent less overhead. I look for areas where PCs can make a concrete, measurable difference like this on a large scale. Insurance companies have speeded up application processing incredibly, for instance.

"There are many situations I can think of where the imaginative use of a computer can contribute greatly to a manager's performance. These produce measurable factors common to improved management style: increased market share; strategic moves into new markets; measurable increases in productivity; cuts in production costs."

Not Replacing Managers

Ferrara does not believe that the introduction of the personal computer in corporate offices will result in big drops in body count among middle managers. He points out, for example, that the driving force behind recent middle management cuts in the auto industry was the drop in sales. "They had to drop costs to compete with the Japanese," Ferrara says. Top management just ordered 10 percent cuts in middle management. "I've seen a lot of situ-

ations like this. Department heads are forced into making the adjustment. Computers were not involved."

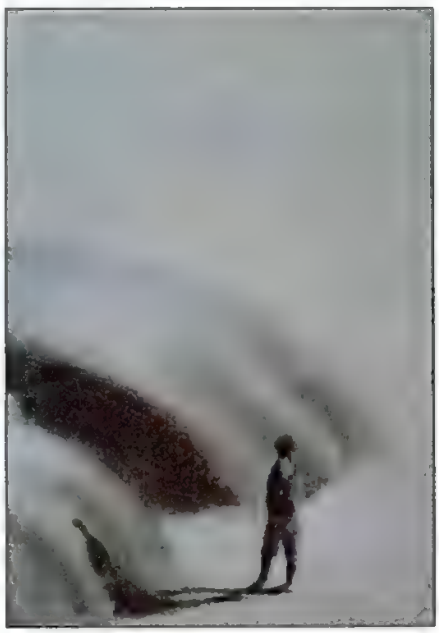
Resistance at the Top

Dorine Andrews, president of Performance Resources, a firm providing training and personal computer support services for large corporations, thinks micros have not yet made drastic changes in the power structures of corporations. "In introducing any new product, you have to pay homage to the mores of the corporation. [Northwest Industries' president] Ben Heineman is an exception to the rule. Most top executives resist having a terminal on their desks. But that is slowly changing. I see no sign of middle managers being cut out by increased computerization. I do see a trend toward increased use of computers and automation throughout corporations.

"As to who holds the power, technology can easily become a way to build a power base. Information is a kind of power. Having or not having certain figures can make a major difference in the success of sales or marketing proposals. The person who has access to computerized information in a corporate setting tends to usurp a certain amount of power. It is a tendency that is hard to fight."

Many top executives have had trouble integrating PCs into their work styles. "They just have to do it when and if they're ready," says Andrews. "It presents a difficult learning situation for some. They feel like they're back in high school. They feel they're on top now, so why should they go back to feeling powerless? It's not until the computers are up and running and the executives start to recognize the productivity gains that they become enthusiastic. Once that happens, they're ready to implement a more general computer system for the entire corporation."

Jack Tavs, computer coordinator for a department of 150 financial analysts at Dean Witter in New York, finds that few middle managers resist computerization. "If there's any resistance, it's at the top, among older executives. Once one research analyst sees how productive it is to access a database like the Dow Jones News/Retrieval Service, he's generally won over. The PC clearly replaces a lot of dull pencil-and-paper computing; there's just no contest. Who in his right mind would rather spend 2 days working out a financial forecast by hand when software products such as *VisiCalc* can do it for you instantly?



It's hard to think of an analyst with a paper and pencil competing against one with a computer.

"For almost any kind of financial analysis, the PC is a vital tool" observes Tavs. "It gets you on-line to hundreds of databases, and it allows you to group stocks according to different performance criteria. It's hard to think of an analyst with a paper and pencil competing against one with a computer."

Against Their Will?

Are middle managers being forced to computerize? One answer comes from Lynn Salerno, a *Harvard Business Review* editor, one of whose specialties is following corporate uses of computers. "The pressure is on the younger managers to keep up with the times and learn to use computers. Older managers can get away with being antagonistic toward computers and delegating the work done on them to a subordinate. Gradually, though, the pressure to have a terminal on your desk is becoming irresistible."

How have micros changed Leavitt's view of the function of middle management? "Personal computers offer top managers more choices," he says. "All important data can be directed toward a central source, and decisions can be made on the basis of data received. In this scenario, the executive needs a computer expert on hand to maintain the system—but this person need not be high up in the management ranks."

The other possibility is to take advantage of the PC's standalone powers and set up a decentralized information system. This, Leavitt points out, involves a different orientation on the part of top executives, and a commitment to building a responsible middle management team. This commitment must be backed by training and executive development programs blending computer and management skills specific to the company involved.

Would he now revise his 1958 forecast? Not just yet. Leavitt thinks personal computers are still too new a phenomenon for him to predict their effect on managerial direction. Centralization may well turn out to be the direction chosen by most corporations. "Given a choice of centralizing or decentralizing, history shows that most nations, institutions, and corporations choose to centralize and keep as much power and control as possible. I have never seen anyone give up power willingly. My dark vision of 1958 may not be that far off the mark after all." ■

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From Mainframe To Micro

Dapper's Rite Of Passage

Gene Knight, developer of the Dapper electrical engineering program, describes how after 10 years his pet product found success in the PC market.



From the inception of the industry, computer companies have been riding one of the riskiest roller coasters in the business world. Industry forecasters watch anxiously as cars are added, only to see them fall off again. The ride has been maddening enough to watch, but consider its impact on those who've sat in the cars—people like Gene Knight, president and principal engineer of SKM Systems Analysis, Inc., an electrical engineering consulting firm.

From his student days, when the most compact computers filled rooms, to the present, Knight has watched the industry go through its so-called "generations." To him, each one represents a step in the development of a program named *Dapper*, which solves the mathematical problems associated with electrical engineering. Written in 45,000 lines of FORTRAN (see sidebar), *Dapper* is now available for the IBM PC (and other micros) at a cost of between $6,000 and $12,000, depending on the configuration and the number of users.

Dapper's Evolution

Though *Dapper's* market is limited by its specialized nature, the course of its development and marketing was not unusual for the software industry. Knight and his partners perceived a need to automate certain electrical engineering functions, but they faced a market composed largely of small businesses that couldn't afford their own computer installations. At first, then, *Dapper*'s widespread application was accomplished through time-sharing and the use of mainframes for the original version. While the idea of adapting *Dapper* to microcomputers was financially appealing, its developers were wary of venturing into an unsettled hardware industry, with its dangers of incompatibility and overnight obsolescence. Finally, when IBM entered the microcomputer market and some measure of standardization seemed possible, *Dapper* was ready to enter the micro market too.

"What we have gone through is an evolution that others will go through," says Knight.

"We are probably the first significant engineering application available for the PC. We get telephone calls from other firms saying, 'How did you do it? We considered this kind of program, and we couldn't do it.' I tell them to go back and look again."

Written in 45,000 lines of FORTRAN, Dapper is now available for the IBM PC at a cost of between $6,000 and $12,000.

Big Jobs for Small Firms

Knight and two partners started SKM 15 years ago as an electrical engineering consulting firm. Among its services, the firm examines building plans to determine whether the proposed electrical equipment is safe. "One important step is to do short-circuit analysis," Knight says. "Normally everything works fine, but when you get a short circuit, a lot of power moves through the system very rapidly, and things tend to blow up. Engineers run short-circuit analyses to determine how much electricity will move through the system, and with this information, they can select equipment that will handle that magnitude of current in the event of default." Computing the minimum amount of equipment required to provide the maximum amount of safety at the cheapest cost used to take weeks of work, because the calculations were done in longhand. A simple building, such as a small department store, could require as many as 750 separate calculations, which would take more than 10 days of tedious work. A more complicated building could take ten times as long. Because of the amount of time and work involved, electrical engineers often estimated loads rather than calculating them mathematically.

Computers were a natural for this type of calculation, and as is common in many new applications, the large companies—most notably utility companies—led the way. Large-scale techniques—and the mathematical formulas and functions—developed by such utilities as the Bonneville Power Authority in Washington and the Tennessee Valley Authority served as the groundwork for developing a commerical program. "The utilities faced the same problems small firms did, but on a scale 100 times greater," says Knight. "Some utilities were willing to share their knowledge, some weren't. They developed some very good user groups, but consultants weren't privy to them.

"In the mid-1960s, firms like ours were still doing those computations in longhand," recalls Knight. "We decided there had to be a better way. By 1972, we decided to write our own program since this kind of application was not available at the time. We used the facilities at UCLA and wrote on an old IBM system that went down every time it rained. We would go in and work on our programs around midnight or 1 a.m. because that was the only time available."

The company sought to sell *Dapper* among the approximately 18,000 consultant engineering firms in the country. This sounds like a big market, but it was limited by firms' lack of familiarity with computers and by financial constraints, according to Knight. Approximately 80 percent of these engineering firms have fewer than five people working in the office. "It is a small and very diverse community," he says. "Firms do not have the financial or technical resources to develop computer programs."

At first, SKM tried to sell *Dapper* to a larger software company. "The company's first response was, 'No, we don't see an application,' " Knight recalls. "But around 1978, Control Data contacted us again and asked if we were interested in

Illustration: Reynold Ruffins

putting the program on a mainframe. We said yes."

That program was *Dapper* (version 1.0), and it performed such principal engineering tasks as analyzing the direction of an electrical flow in a complicated system and calculating the amount of power and charge of the flow. The program didn't do simpler computations, such as determining the number of transformers, because Knight and his partners believed that engineers would not want to pay connect time for tasks they could easily do themselves. The program was available through Control Data's Cybernet network, and its users were engineering firms that were too small to have their own mainframe installations, but large enough to afford time-sharing.

The Shift to Micro

As micros became increasingly available throughout the 1970s, Knight and his partners set a goal: They wanted to run the *Dapper* program on a microcomputer. "We didn't expect it would come easily, and we knew it would take time," said Knight. Initially, the firm acquired a Wang. He recalls, "It was one of the first Wangs; it had a cathode ray tube, 16 lines, a tape cassette, and 8K of memory. Its serial number was EX 0006. I called up the service guy and asked him if it was an experimental model, and he said: 'No, only the first five were experimental.' "

Besides being slow, the early micros could program only in BASIC, a serious limitation for a program that needed complex numbers. The time-sharing version of the *Dapper* program had been written in FORTRAN, which is a common engineering language on mainframes.

After running *Dapper* for several years on time-sharing systems, Data General asked the company to download the program onto one of its mircocomputers—a 16-bit machine with 64K memory and operating a 12.5 megabyte fixed disk. It took 10 months to translate the program into a micro version, but the company was also able to add additional functions that it had been forced to leave out of the time-sharing version. What was too expensive to do on mainframes was cheap enough to do on the micros.

The shift to a micro also demanded that *Dapper* become easier to use. The new version includes full-screen fields for entering data and utilities to prevent crashing. The program is menu-driven, and the only way to crash it is to crash the computer.

In about 10 years, SKM managed to identify its proposed market and then develop a program that could be translated from mainframes to affordable micros. While moving the program required work, the biggest problem was in marketing. "We were getting a good response from Data General, but there was some resistance to Data General itself within the engineering firms," explains Knight. "The firms' structural and civil engineering departments already had computers, and they didn't want to have to buy another system for their electrical engineering departments."

Tapping the PC Market

About a year ago, Knight's company faced several options. There were rumors that Data General was planning to offer a desktop computer, but IBM's PC was clearly beginning to dominate the market. SKM decided to go with the PC, primarily because of the different marketing strategies of the two companies. "We love the Data General," says Knight. "It's one slick machine, but the company markets it on a one-to-one basis, whereas IBM markets its computers on a mass-merchandising scale. The Data General is technically more advanced: It has more memory; it brings its own sophisticated version of FORTRAN and an operating system to run on it; it is more powerful and about twice as fast at about the same price." But we get much better market distribution with IBM.

Knight's experience marketing *Dapper* for the PC bears this out. "About one of four engineering firms we contacted already have PCs. This really opens up doors for us. We don't have to sell com-



puters; our interest is selling software."

Now that *Dapper* is available on the PC, various utilities and manufacturing firms that use large amounts of electricity, and the United States Navy have inquired about the program. The Navy is considering using *Dapper* to chart electrical systems on submarines. Others have inquired about using it on the PC compatibles.

"What IBM did was to provide continuity in hardware," says Knight. "Any application is a marriage of hardware and software. From some companies, we had no guarantees about the hardware they were developing. We didn't know whether our software would be compatible. IBM made us confident that we would not be left out in the cold. We trust IBM to offer a high degree of upward compatibility. If you look at history of major firms—IBM, Data General, and Prime—they have a history of upward compatibility. You can't say that about the rest of the computer industry."

The new user-friendly *Dapper* has been launched into a market that can finally afford to buy the hardware it runs on—the PC. Has it been worth it?

"I see *Dapper* as a major factor in improving the quality of engineering," says Knight. "Many of the tasks that can be done with *Dapper* were not being done in longhand, either—they were simply being overlooked. What this program can do is allow more work to be done more rapidly. Engineers will be able to choose five different alternatives for what one plan used to cost. The net result is that engineers will be more comfortable about making changes.

"With *Dapper* on a microcomputer," says Knight, "you can work the electrical system of a 20-story building in about 6 minutes. On a mainframe, of course, you can do it much faster, but by the time you log on, stand in line, and wait for the roll-out cue, 3 to 5 minutes have elapsed anyway. If you can do the same thing on a micro in 6 minutes that you can do in 5 minutes on a mainframe, ultimately you will still choose the microcomputer." ■

A Following for FORTRAN

Although this number-crunching language doesn't appeal to the general public, it has carved out a niche for itself in the scientific community.

During the mid-1950s, a group from IBM and some of its customers began working on what became the first widely used procedure-oriented language for computers. Because it was designed for problems related to mathematics, the group called the language FORmula TRANslation, and FORTRAN was born.

Gene Knight, president and principal engineer of SKM Systems Analysis, Inc., remains committed to FORTRAN for engineering applications, despite the language's unpopularity with some programmers. Knight's firm has developed an electrical engineering program, named *Dapper*, which is written in 45,000 lines of FORTRAN. Choosing the programming language to develop *Dapper* was never really a contest. "I got my first training in FORTRAN," said Knight. "At that time, it was the only language available to us."

The language got its early boost by being the first, but its popularity kept growing because of its advantages for scientific tasks. Programmers like its reliability, its portability, its ability to handle mathematical functions, and its speed. These factors outweigh such handicaps as a less reliable I/O function and the responsibility that programmers include crashproof protection. As computers moved from the technical and scientific realms to the business arena and then to the home market, FORTRAN's primary use as a mathematical computation tool limited its acceptability. But it still maintains a comfortable niche in commercial, scientific-related programs.

"FORTRAN is a natural language for engineering, because typically, it supports complex numbers," says Knight. "It supports a lot of very fast number crunching. And it allows for good structuring. It allows you to generate tools and subroutines that you can use over and over again. If you're dealing with complex numbers in FORTRAN, you can separate them into real and imaginary. If you want to divide one by another, you can do it with a net result that it is done in one statement."

FORTRAN's greater structuring allows the programmer to order tasks more easily than he could in some other, less-structured languages, says Knight. "We can typically take an engineering program and break it down into discrete tasks. For example, taking some information from the record and putting it on the screen is one task; a second task would be accepting data on screen, and the third task would be to take the data off of the screen, check it for errors, and put it back into a record.

"So you have three distinct tasks. Each one of these tasks could take 200 to 300 lines of programming. Inside each task you might have the problem encoding real variables and integers and encoding character data. But you can take these small problems and write subroutines for them, and you can use the subroutines over and over again. Once you develop a library of subroutines, these tasks become straightforward and easy—far easier than in BASIC."

FORTRAN does have some limitations. For example, writing an interactive program in it is far more difficult than in BASIC, says Knight. "An interactive program in BASIC is straightforward. This language protects you, so to

speak, from input data errors. With standard FORTRAN, input and output is awkward because of its formatted procedures. There is no routine provided by the language to make your program crashproof. I can build the protection provided by BASIC into FORTRAN, but it's always the programmer's responsibility to add it."

To solve these FORTRAN-related problems, SKM developed a library of subroutines to include in its *Dapper* program. The routines allow some of the built-in safety of BASIC without losing the essence of FORTRAN—its mathematical ability. "The key to making FORTRAN work is to write a strong utility library," says Knight. "Our library allows us to use FORTRAN to handle the mundane tasks normally handled by BASIC or another language. We can send to screen, check, encode, decode, right and left justify by fields, determine fields, and clear the screen. Most of our users are sophisticated technically, but they are computer illiterates. These small utility programs allow them to work the program easily."

Perhaps the biggest drawback to programming in FORTRAN is graphics. "On the PC," says Knight, "graphics are not supported in FORTRAN without a great deal of effort." Even a scientific graph using a log-log scale can require some 8,000 lines of programming to drive the plotter.

Still, Knight feels that the disadvantages are outweighed by FORTRAN's speed. "Just look at the speed you can get out of this rascal," he says. "It's ten times faster than BASIC. That's what we call hauling buns."—**M.M.**

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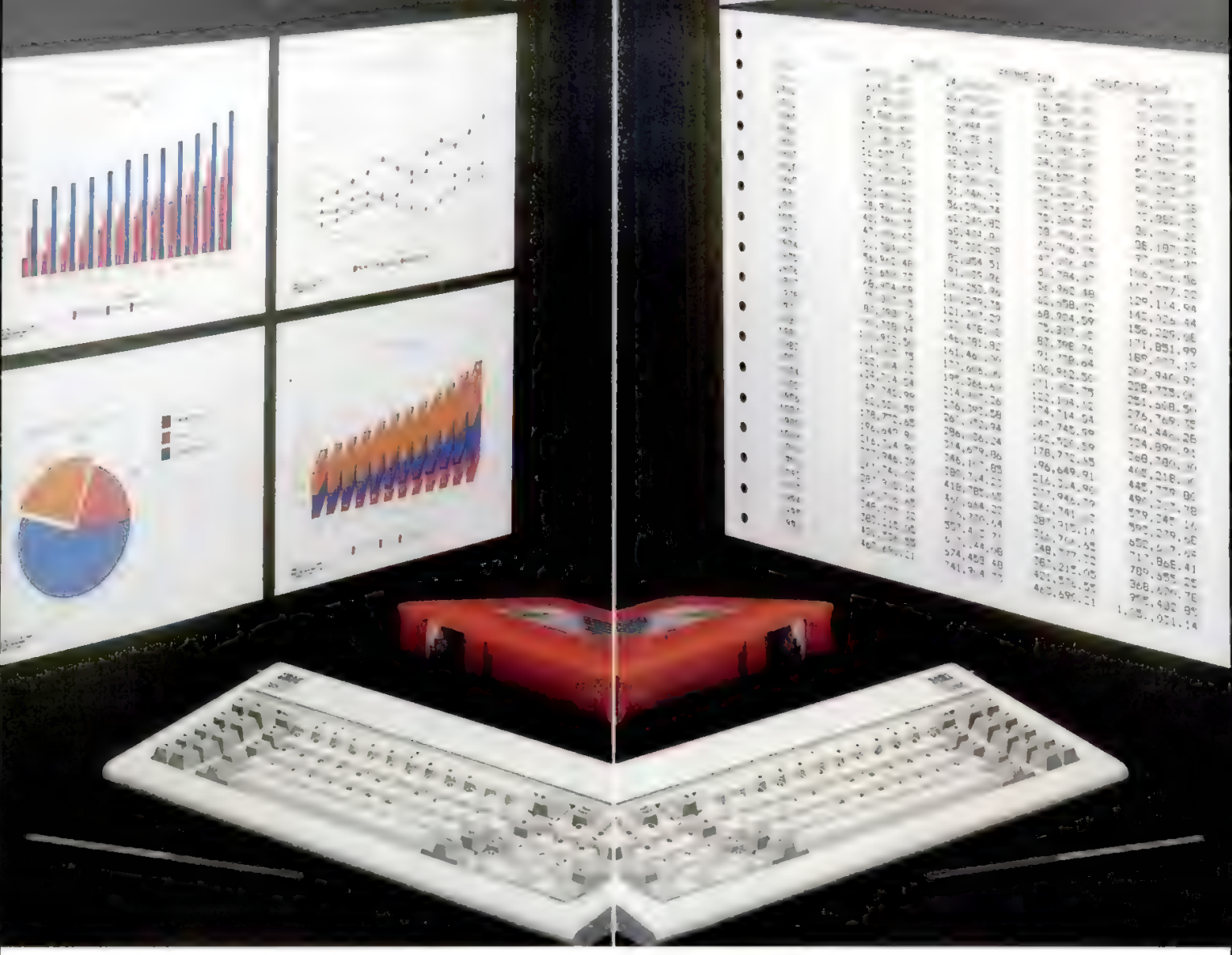
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Hi-Sci Research From IBM's Think Tank

Scientists at the IBM Thomas J. Watson Research Center are conducting research in a wide range of scientific fields to develop ideas for new products and computers.

Less than 45 minutes from New York City a striking contemporary building crowns a wooded hilltop in Yorktown Heights, New York. Though it looks like the student union at a modern university, the building is actually one of the world's foremost incubators of scientific research—the IBM Thomas J. Watson Research Center, Big Blue's premier scientific laboratory and think tank. Within the center's walls, scientists are developing new ideas for products and computers.

The IBM Research Division, named after the company's long-time chairman, Thomas J. Watson, Sr., has about 2,400 people on staff—1,800 at the Yorktown site, 500 at a laboratory in San Jose, California, and another 125 at a lab in Zurich, Switzerland.



An aerial view of the IBM Thomas J. Watson Research Center in Yorktown Heights, New York, home of the corporation's premier scientific laboratory.

Wide-Ranging Research

Big Blue's "noodlers" are a busy bunch. It surprises you to learn the range of scientific background represented by staff members. Over the years, the center's scientists have achieved notable accomplishments in many fields. Some of their breakthroughs have been integrated into technology that has become standard. Some of these are:

- Field-effect transistors (the dominant technology in semiconductor memories);
- Computer languages such as FORTRAN and APL;
- Moon-shot calculations used in NASA's Surveyor, Lunar Orbiter, and Apollo projects;
- RAMAC, the first commercial RAM magnetic disk storage unit;
- The first magnetic-core main memory for a computer;
- The second laser ever built, the solid-state laser, and the discovery of laser "tuning" with organic dyes.

The Research Division digs into such matters as magnetic superconducting, thin film science, materials analysis, quantum physics, chemistry, and theoretical physics. Why? Because the nature of computers demands an understanding of individual components far more exact than almost any other technology. Because modern computers contain millions of parts, each of which may perform some function millions of times per second, each part must be 100 percent reliable. And producing a reliable product requires a deep understanding of the way in which each of these components interacts. "Such diverse research," commented Dr. Denos C. Gazis, assistant director of the Department of Semiconductor Science and Technology, "makes the center a better place—it's more exciting."

Furthermore, IBM has a selfish explanation: "If it participates in a wide range of scientific activities, it is better equipped to bring in new ideas than if the company confined itself to making a computer and waited for outsiders to generate the new ideas. By participating in such diverse field of research, IBM interfaces with the wide world of science."

PC Robots

The IBM Research Division incorporates research from wide-ranging scientific activites to produce new machines, and it also uses its own Personal Computer for a number of research projects. One such area is robotics.

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demonstrated two new robotic systems. It began limited marketing of its RS-1 robot and the low-cost 7535, built for IBM by a Japanese manufacturer. For this smaller robot, the scientists took a subset of the language it had developed for the big robots and transferred it to the PC.

"You can use the PC's arrow keys to move the robot to do the initial programming," explained Robert R. Leavitt, technical assistant in the Manufacturing Research Department. "You can program off line, take the program, dump it into the robot's controller, disconnect the PC, and go on about your business."

The PC is used for other robotics functions, too. "After you've written a program for moving the robot," continued Leavitt, "you can determine how long the robot will take to execute its tasks without actually running the program. This allows you to calculate the actual running time within a couple of percentages."

The center's researchers are finding that the PC has many uses. According to Dr. Gerald Waldbaum, manager of Advanced Workstations Projects and Services, there are more than 500 researchers within the Research Division now working with PC and more are receiving them every day. And, added Waldbaum, they have the same problems that any PC owner faces. For instance, what hardware or software do they need for particular requirements.

To help find answers, Davis Foulger, a consultant in Waldbaum's department, helps the center's scientists select and "test drive" equipment suitable for their particular applications. Each user receives a "starter set" of software that includes text processor, file management, graphics, and general DOS programs—some of them developed by IBM but not yet released to the public.

Fougler's counterpart, Dave Williams, provides the specified hardware. He is an electronics engineer who customizes every PC for individual use. Williams' office, a room stacked with cartons of factory-fresh PC components, is referred to as "the candy store."

The Workstations Projects and services Department also conducts a 24-hour-a-day, 7-day-a-week PC source it calls "Forum." This bulletin board and computerized file system helps IBM personnel who have problems or questions about their PCs. It's intended for business purposes only, but, as Waldbaum noted, "It has become difficult to know when IBM business begins and when it ends, because the PC has so many possibilities. In the past,

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computer activities such as games weren't part of IBM's domain. Now they are legitimate topics for discussion."

The Forum carries an internal PC newsletter and flags news articles and magazine pieces of interest to PC operators. It also provides files of user observations about software or hardware that often suggest debugging procedures. Finally, the forum lists computer club meetings at all IBM locations so that traveling employees can attend meetings at a particular site.

Building a New Machine

Meanwhile, as the PC users continue to call in, the researchers in Computer Sciences are working on hardware and machine organization to boost IBM 370 performance by a factor of 5 before the end of the decade. They've also designed a totally new computer dubbed the 801, the center's number in IBM's real estate inventory.

To do so, the 801 is being designed to incorporate those computer operations that research has shown to be most needed, and it will execute these operations super efficiently. And not surprisingly, the 801 uses innovative hardware and software. Gazis describes it as a minicomputer capable of executing instructions in 1 cycle instead of several. He believes it is "one of the greatest contributions to machine architecture in 15 years."

In another department, Logic and Memory Technology, the researchers are focusing on silicon chips and packaging. Though they recognize that a time will come when the potential of silicon chips will have been exhausted, they still see great possibilities ahead.

"In the next 10 years we're going to manufacture silicon chips that are a lot better than they are today," predicted Gazis. "You can expect their speed to be increased by a factor of 10, maybe even more, and their size will shrink by almost an equal factor. They'll be smaller, denser, faster, and cheaper. One little chip that



The Thomas J. Watson Research Center houses 1,800 scientists who develop new ideas for products and computers.

THINK TANK

now may have a memory of 4,000 bits will have 4 million bits by 1990 or 1992."

He added cautiously, "When we talk about a future product's capabilities, we're talking about what the Research Center believes is possible—don't get the impression IBM is announcing the actual product."

Still another significant section of the Research Center is the Systems Laboratory. This lab devises tools to measure computer performance. "They're a little like stethoscopes," said Irving Wladawsky-Berger, the lab's director. "They help us monitor a system's heartbeat as data and instructions speed through it." These observations enable the scientists to develop principles to design better systems.

"The resulting data help us to make our case, Wladawsky stated. "We're dealing in facts, not opinions. When we're able to sell an idea to IBM's product divisions—also known as transferring technology—it's like bringing a show to Broadway and discovering it's a big hit." Most of the lab's "hits" are secret—proprietary achievements incorporated in IBM products that are still in the prerelease stage. But its hardware successes include processor design, storage hierarchies, multiprocessing structures, and input/output architecture. In software, the lab has scored with major system control programs, compilers, and new computer languages.

Wladawsky's view of his lab associates holds true for the whole spectrum of IBM's research scientists. "We need a special kind of person, one who is highly motivated. We need a number of people because no one person can totally grasp all that's involved. Often, when we have meetings with our highly charged staffs, the sparks fly." And these are the sparks that ignite new ideas that illuminate IBM's path into the future. ■

Lester Brooks is a free-lance writer who contributes to national magazines in various fields. He is the author of nine books.

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No one likes to pay taxes, but most people accept the burden almost cheerfully until the time comes to actually prepare their income tax returns. By April 15, even the calmest and most patient among us may be driven a bit balmy by the byzantine and ever changing requirements of our tax laws. Many taxpayers resort to paying tax preparers as well as the Internal Revenue Service. I, however, don't feel comfortable depending on a third party that lacks a personal stake in the outcome. So, like millions of Americans, I risk my sanity by preparing my own tax returns.

Last year, I tried something different. I attacked all my tax computations on my IBM PC using *VisiCalc*, and I was quite pleased with the results. This year, I'm positively ecstatic! Almost all of the work I did last year is still applicable this year, so accurate tax return preparation has become a breeze!

Using the *VisiCalc* template I created last year, I was able to enter all data for 1983 (including the revised tax schedules) in about 1 hour. Copying the computed results to the appropriate forms took another hour, so I completed my entire tax return, including a depreciation allowance for my IBM Personal Computer, in about 2 hours! This job used to consume an entire weekend. If time is money, you can imagine how pleased I am by this substantial savings. Furthermore, once you get the template right, *VisiCalc* results are



Illustration: Rich Grote


12
3
6
9

thoroughly dependable.

Of course, spreadsheet requirements vary according to individual tax situations, so not everyone can use the same template. The suggestions that follow are aimed at helping you create your own template using your own spreadsheet program. Any spreadsheet program will work, but *VisiCalc* comes close to providing a common denominator for all spreadsheet programs, so I shall use it as a basis for my examples.

Paper shuffling is a major contributor to tax return errors. A number from one form may fail to get transferred to another form. Flipping through pages of instructions to locate a table takes time and breaks continuity. This results in errors. Perhaps the most important function of any tax return preparation aid is to minimize errors by separating data entry from computation and rules interpretation.

To create a tax return template, you go through the forms and instructions to establish a structure that encompasses the formulas, constants, and relationships in the tax forms. Then, you simply fill in the blanks with data collected over the tax year and kept from your personal records. The program applies the structure to the data and produces the values required to complete tax return forms, all without further reference to the instructions. Thus, the program does the paper shuffling for you, without error. Remember, though, that using a computer program as a tax return preparation aid is not a substitute for professional advice regarding interpretation of the rules, nor does it eliminate the need for complete and accurate financial records.

Unlike many specialized tax return preparation programs, *VisiCalc* does not print tax forms. On the other hand, it is very easy to tailor a *VisiCalc* template to your individual circumstances and to update it without additional cost from year to year. Specialized tax programs tend to be less flexible, and you must pay extra for annual updates.

A spreadsheet program also offers the power of decision evaluation (that is, a "what if" analysis). Once the template is defined and initial values are entered, the bottom-line effectiveness of alternate tax strategies is easily tested. "What if my spouse and I filed separately instead of jointly? What if I declared my PC as an expense rather than taking capital depreciation?" A properly designed template can test these options with just a few keystrokes.



Creating a Template

Four basic spreadsheet facilities—label creation, formula evaluation, value linkage, and table lookup—are essential to your tax computation template.

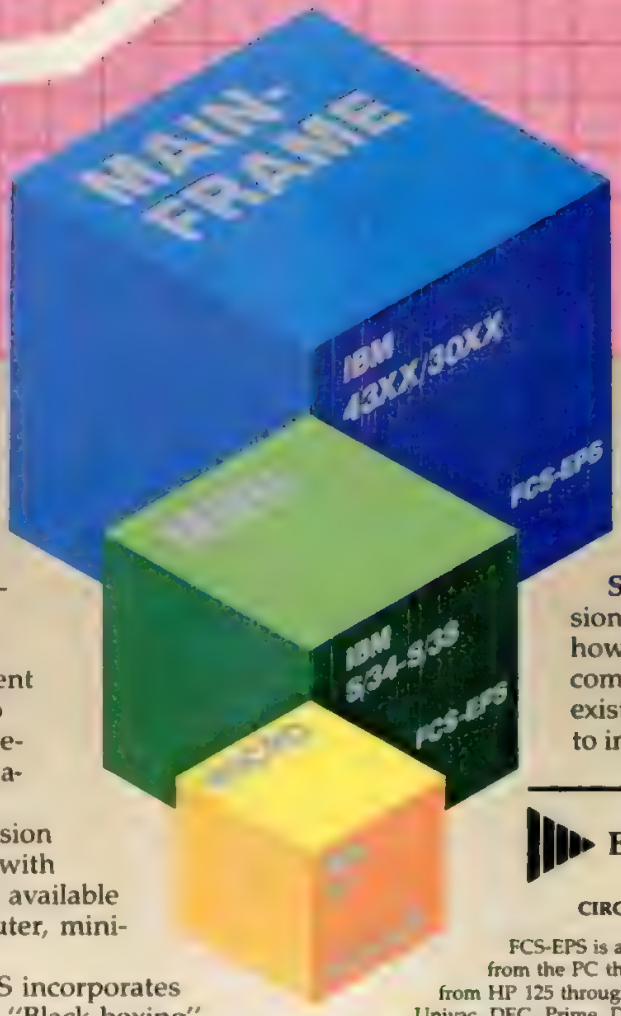
Labels help the user to identify spreadsheet fields in the same terms used in tax forms, while formula evaluation provides the mechanism for computing taxes.

Value linkage permits use of a single value in several calculations. It also allows the result of one calculation to be used as input elsewhere. For example, field H7 might contain *+A3*, indicating that the result value assigned to field A3 is to be copied into field H7 (a forward reference). Linkage may be extended to several levels (A3 references H7, which references I8, for example). Forward references are propagated in a single spreadsheet update operation. Backward references (for example, field A3 contains *+H7*) require an additional update cycle.

Table lookup provides the mechanism for using the various tables and schedules involved in tax computation. It also permits selection of the appropriate calculation from among several options, based on another value. For example, the proper tax rate for a given taxable income is selected using taxable income as a search argument. Then, the appropriate tax computation is selected using filing status as a search argument. This technique can be extended to as many levels of table lookup as are necessary.

To set up a *VisiCalc* template for income taxes, you apply these four functions to the tax return instructions and forms. Start by defining an appropriate column width. I chose 19 because it's the largest value that permits display of four columns of data on an 80-column monitor. Four columns of data allow reasonably descriptive labels without creating unreasonably large spaces between columns of labels and columns of values when using a paired-column format. Of course, you

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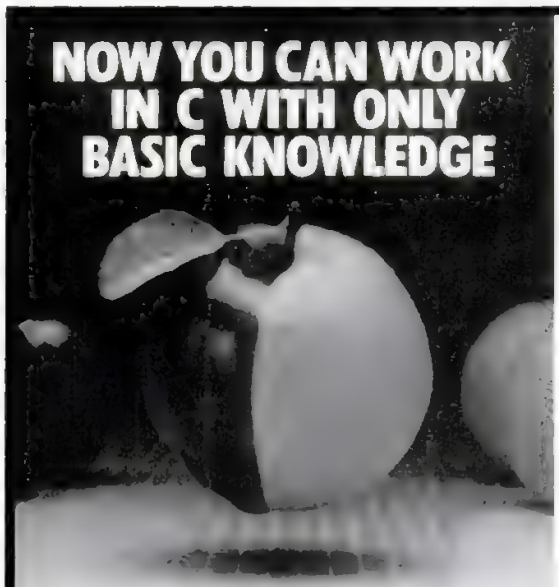
may find that a different column width better suits your purposes.

Then, define the global format as dollars and cents using the /GF$ command. This aligns the decimal points and makes reading columns of values easier. Integer value fields, such as filing status, can be properly formatted by using the /FG command to override the global format. Next, define the general data fields, such as filing status and number of exemptions, and label these entries so that they are easily recognized. They will be referenced frequently. Use a separate area of the spreadsheet and include a section total using the @SUM function. Identify each section with an easily recognized label, such as "Adjustments To Income."

Finally, where a form 1040 entry calls for the total from another form, enter the coordinates of the section total for that

```
        A                                                    B
1  Filing Status:                                          (value)
2  Total Exemptions:                                       (value)
3  Wages, Salaries, Tips:                                  (value)
4  Dividends:                                              (value)
5    Dividend Exclusion:                                   @IF(B1=2,200,100)
6    Taxable Dividends:                                    @MAX(0,B4-B5)
7  Capital Gain (or loss): Coordinates of @SUM(Schedule D)
8  **** Total Income:                                      @SUM(B6...B7)+B3
9  **** Taxable Income:                                    +B8+@NA-(@NA+1000*B2)
   (The first @NA is "Adjustments to Income", 1040 line 31)
     (The second @NA is "Deductions", 1040 lines 34a+34b)
```

Figure 1: *Sample formulas for several lines of tax form 1040.*



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form. If you haven't yet defined the form, enter @NA to signify that the value is not yet available. Completing the template requires the substitution of proper definitions for all @NA entries. Luckily, formulas using @NA values are evaluated as NA, so it is easy to trace back to the source @NA of a reference chain.

You may decide that a particular line of form 1040 has no bearing on your situation. If so, you may simply omit that line from your template. However, I opted to include lines that do not apply to my present situation, but that might apply to me in the future. I also included lines that probably will never apply to me, but that might be useful to friends with whom I share my template. In either case, the line should be assigned no value (leave the value field blank) so that it will not influence statements referring to it.

Sample 1040s

Figure 1 shows sample formulas for several lines of form 1040. The entries in



column B must be entered as *VisiCalc* values. Figure 2 illustrates the use of the @LOOKUP function to obtain a table entry. The format and rules governing the use of *VisiCalc* functions are described in the *VisiCalc* user's guide. These brief examples illustrate the application of the basic functions to tax return preparation, but they are not sufficient to define a complete tax return.

Your template should be organized to look like the forms and schedules it represents. I enter forms from top to bottom, and then from left to right, in the order they are encountered in the normal sequence of preparing a tax return. You can choose the method that you find works best for you.

Enter each form as it is encountered, using @NA values to reference other forms not yet defined. Complete one form before beginning another. Jumping back and forth between spreadsheet sections is as confusing as shuffling papers. The next undefined form can be found by scanning entered fields, in the same sequence as

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–Gives subtotal, total and net profits where desired
–Displays to screen or printer up to 6 months and year-to-date

• Mail-Out . . . . . .
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–Outputs to a printer for labels to mail out information
–Has file search for names

• Inventory Control . . . .
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–Keeps 6 columns of information for up to 1000 items. The columns are Name, Quantity, Item Cost, Total Cost, Reference Quantity, and Note

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they were entered, looking for the first @NA field.

Once all the required forms have been entered, type in the tables and schedules required by the entered forms. It is probably not worthwhile to spend your time entering the Tax Tables. If they apply to you, your tax return is likely to be simple enough to use form 1040EZ, which is not complex enough to justify the use of *VisiCalc*. On the other hand, I found it useful to enter all the Tax Rate Schedules and the Optional Sales Tax Table, as well as any applicable State Tax Tables. This is a bit tiresome, but it provides a continuing base for future tax returns. In years to come, I won't have to decide whether the old tax schedules still apply to me—I will merely update the schedules from the new tax forms.



To simplify template design, you may choose to enter only the schedule that suits your present status.

State and City Tax

Tax return preparation is considerably more difficult in states that have income taxes of their own. City income taxes, where they exist, further compound the difficulty.

```
          A                                        B
11  Zero Bracket Amount:                  @LOOKUP(B1,A12...A16)
12          1                                          2300.00
13          2                                          3400.00
14          3                                          1700.00
15          4                                          2300.00
16          5                                          3400.00
```

Figure 2: *An example of how to use @LOOKUP to obtain a table entry.*

```
        A                                        B
20 Local Sales Tax Multiplier (from footnotes on pp. 35-36):
21   (e.g., NY State, local tax 1%)      1.26
22 Optional Sales Tax Table Value VS Family Size:
23  1   (@LOOKUP(B8,A33...A49)+B50*@INT(@MAX(0,B8-35000.01)/5000
24  2   (@LOOKUP(B8,A33...A49)+B50*@INT(@MAX(0,B8-35000.01)/5000
25  3   (@LOOKUP(B8,A53...A69)+B70*@INT(@MAX(0,B8-35000.01)/5000
26  4   (@LOOKUP(B8,A53...A69)+B70*@INT(@MAX(0,B8-35000.01)/5000
27  5   (@LOOKUP(B8,A73...A89)+B90*@INT(@MAX(0,B8-35000.01)/5000
28  6   (@LOOKUP(B8,A93...A109)+B110*@INT(@MAX(0,B8-35000.01)/5000
29 ------------------------------------------------------------
30 Sales Tax Deduction:          @LOOKUP(B2,A23...A28)*B21
31 ------------------------------------------------------------
32 Sales Tax Table for Family of 1 or 2:
33          0.00                                  86.00
34       8000.50                                 103.00
                  (... etc., through...)
49      38000.50                                 282.00
50 Limit extender (bottom of table):      14.00
51 ------------------------------------------------------------
    A31 through A50 and B31 through B50 are repeated  in  A51  through
A110 and B51 through B110 for family sizes of 2 or more.
```

Figure 3: *One method of handling limit extenders—constant multipliers that exceed the figures on the previous table.*

If you choose to include state and local income taxes in your form 1040 template, you are likely to encounter backward references. You can check for these by changing a first-order value (for example, number of exemptions), displaying the Total Tax field, and then pressing the exclamation point (!) key. If the value in the Total Tax field changes, then one or more backward references exist. Press the ! key repeatedly until the Total Tax field no longer changes each time. The number of ! key strikes required to produce the last change is the number of backward refer-

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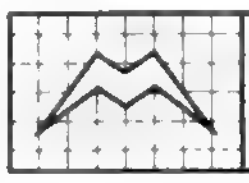
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```
      C          B          E          F          G          H
 1 Schedule X:
 2      0.00       0.00       0.00       0.00       0.00       0.00
 3   2300.01       0.00    2300.01       0.11    2300.01    2300.00
 4   3400.01     121.00    3400.01       0.13    3400.01    3400.00
                          (... etc., through...)
15  55300.01   17123.00   55300.01       0.50   55300.01   55300.00
16 ------------------------------------------------------------------
   (Enter Schedules Y&Z in a similar manner at other locations)
      (Note: Schedule Y is actually entered as two schedules)
90 ------------------------------------------------------------------
91 Tax Computation for Each Filing Status:
92  1  @LOOKUP(B9,C2...C15)+@LOOKUP(B9,E2...E15)*@LOOKUP(B9,G2...G15)
93  2  @LOOKUP(B9,C[Sc.Ya])+@LOOKUP(B9,E[Sc.Ya])*@LOOKUP(B9,G[Sc.Ya])
94  3  @LOOKUP(B9,C[Sc.Yb])+@LOOKUP(B9,E[Sc.Yb])*@LOOKUP(B9,G[Sc.Yb])
95  3  @LOOKUP(B9,C[Sc.Z])+@LOOKUP(B9,E[Sc.Z])*@LOOKUP(B9,G[Sc.Z])
96  5  @LOOKUP(B9,C[Sc.Ya])+@LOOKUP(B9,E[Sc.Ya])*@LOOKUP(B9,G[Sc.Ya])
97 ------------------------------------------------------------------
98 Tax (1040 line 38):  @LOOKUP(B1,C92...C96)
```

Figure 4: *A sample Tax Rate Schedule, including the bracket floor, tax rate, and minimum tax.*

ences in your template. The ! key must be pressed that number of times each time you wish to reflect changed values in the computed results.

My combined federal and state template contains five levels of backward reference, so I must press the ! key five times to ensure that all first-level changes are reflected in all other fields.

Schedules and Tables

Simple tables, such as the Zero Bracket Table shown in Figure 2, are rare in tax computation. Most tables and schedules involve multiple columns of data, implying multiple @LOOKUP operations. In addition, some involve limit extenders—constant multipliers used on values that exceed those on the last table. For example, the Optional Sales Tax Table covers adjusted gross incomes to $40,000. Beyond that limit, a value is added for each additional $5,000 or portion thereof. Figure 3 shows one method of handling this condition.

On the other hand, Tax Rate Schedules (see Figure 4) involve several pieces of information for each bracket: the bracket floor, which must be subtracted from Taxable Income to find the bracket offset value (column H in Figure 4); the tax rate for the bracket, by which the bracket offset value is multiplied to find the bracket tax increment (column F in Figure 4); the minimum tax for the bracket, which is the base tax amount to be added to the bracket tax increment to find the total tax amount (column D in Figure 4).

Filing status determines which Tax Rate Schedule to use. To simplify template design, you may choose to enter only the schedule that suits your present status. However, I created an additional table that selects the proper schedule based on filing

status. This has a number of advantages, including the ability to perform "what-if"

A template could include both standard tax computation and income averaging, allowing comparison of these alternatives with minimal additional effort.

evaluations without changing an entire schedule.

A Less Taxing Solution

VisiCalc can be a valuable tool for preparing your income tax returns, requiring only a little work and a reasonable understanding of *VisiCalc*'s language and rules. Of course, a usable tax return template will contain many more data entries than have been illustrated here, but most of these entries involve either simple calculations or application of the techniques that have been discussed.

The primary value of *VisiCalc* as a tax return tool lies in the separation of instructions and data, as well as in the elimination of paper shuffling that results. Over time, the reduction in effort achieved by entering only annual updates, rather than the entire tax structure, becomes significant. Also useful is its ability to perform "what-if" evaluations. For example, a template could include both standard tax computation and income averaging, allowing comparison of these alternatives with minimal additional effort.

I've been using *VisiCalc* to prepare my tax returns for 2 years now, and I cannot imagine doing it any other way. Try it. The start-up may take longer than you like but the long-term return might take *some* of the pain out of paying your taxes. ■



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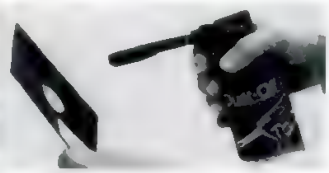
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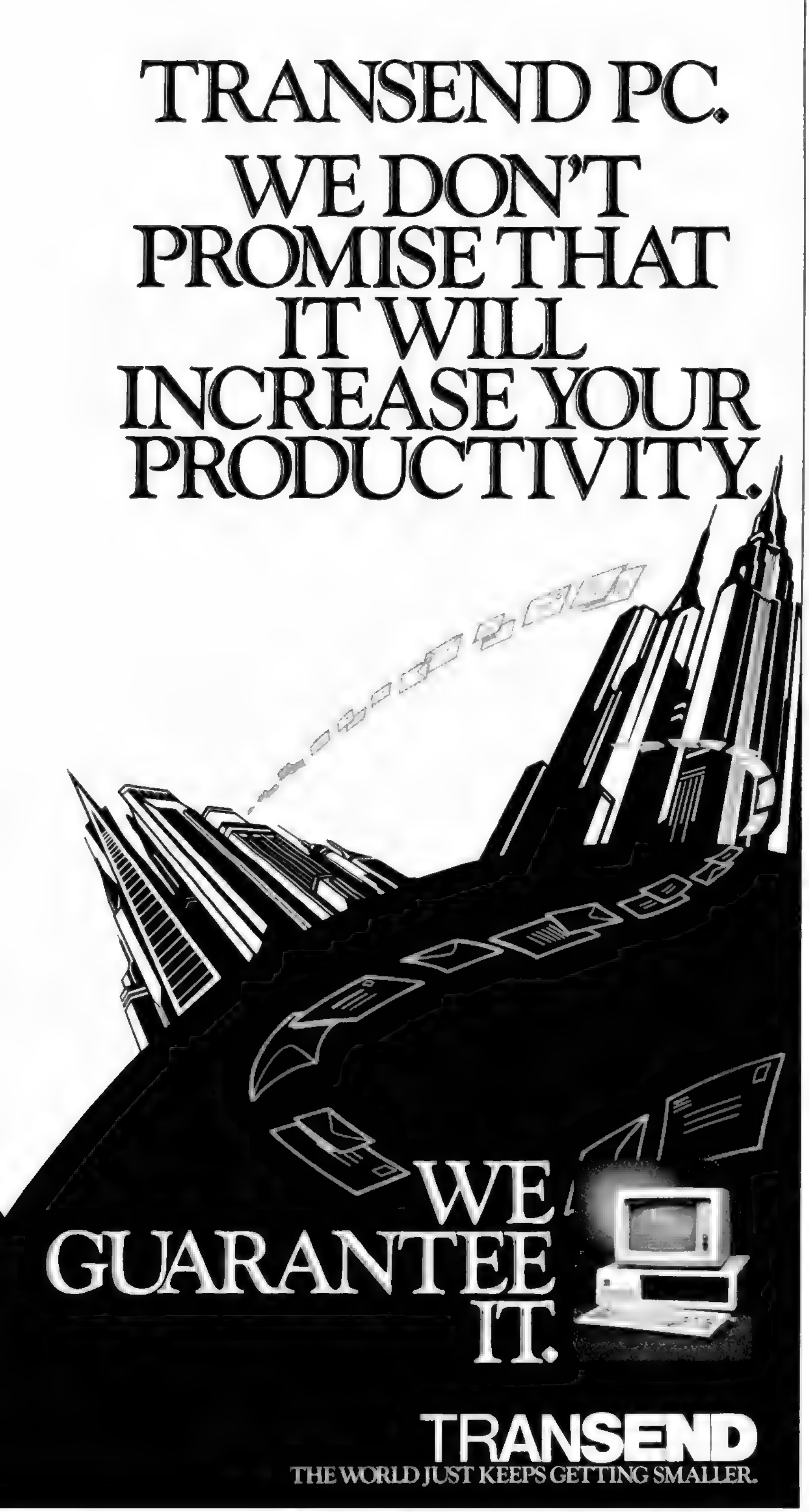
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Are Disk Tutorials The Best Teachers?

Many PC users are turning to disk-based tutorials to learn programs such as 1-2-3 and dBASE II. This may be the most convenient way to learn a program, but is it the most effective?

How many people have purchased a pricey bit of software such as *VisiCalc* and never learned to use it to its full potential? Judging from the number of books and disk-based tutorials on the market to help people learn *VisiCalc*, it seems that authors of complex software such as Lotus' *1-2-3*, *VisiCalc*, *dBASE II* and *MultiPlan* may be writing for their peers. The programs they're producing may be largely beyond the grasp of the majority of micro users.

Publishers have marketed a shelf full of books on how to use *VisiCalc*, but these books run into a basic problem. "People don't read," says computer training consultant Debbie Dunipace of Sacramento. Some software manuals are so poorly written and organized that even users who are willing to read and do research become quickly frustrated. Purchasing additional books may compound this frustration: Users want to sit in front of their IBM PCs and get work done—not wade through a book.

What can you do, then, to get the most out of a complex program on your own time, at your own pace, without attending a class or cracking a book? The answer, according to the many manufacturers that are jumping into this market, is disk-based interactive training.

Lotus Takes a Lead

Lotus Development Corporation began a revolution of sorts by including a training disk in its *1-2-3* integrated package. There is a lot more to *1-2-3* than its tutorial. Its features allow users to make electronic spreadsheets, do word processing, perform database management functions, and make graphs from spreadsheet data.

But the tutorial may have been the key ingredient that allowed Lotus to pull the rug out from under *VisiCalc*, previously the entrenched leader in the electronic spreadsheet field.

As Wallace Judd, a Northern California designer of interactive training systems, points out, "Nobody had to incur any extra cost for training. It was intrinsic to *1-2-3*. It said to manufacturers that a manual and an 800 number are not enough."

Another advantage of the *1-2-3* tutorial, Judd notes, is that it makes dealers comfortable supporting software they are not well acquainted with and can't teach. "Tutorials allow users to try out the software in a supportive environment and to

succeed," says Judd.

Other manufacturers quickly followed Lotus' lead: VisiCorp started producing *VisiTutor*, ATI came out with financial and word processing tutorials, IBM produced *PC Tutor*, and Ashton-Tate unveiled a disk-based tutorial for their *dBASE II package*.

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keep the student awake and focused.

Some people believe that keeping students attentive, a problem that has existed as long as there have been students and teachers, is a major stumbling block for disk-based training. According to Pauline Campbell, a training specialist employed by Cal-Farm Insurance Company, the user's attention is more likely to wander with only a computer and not an instructor to look at.

Campbell has trained Cal-Farm employees in 30 offices throughout California to operate IBM PCs; she uses hands-on methods in a classroom setting. "We have software packages that we use for training purposes, but we haven't found them too effective because most of the people we're training are inexperienced with computers," she says. She points to games software as one way to help computerphobes conquer their fears, particularly when automated systems are completely unfamiliar, as in an office switching directly from manual typewriters to IBM PCs.

Her experience was more positive with the approximately 30 PC users she's trained at the company's home office in Sacramento. Because they had used terminals before, and were familiar with the concepts of storage and retrieval, they did not have difficulty using the ATI tutorials for *SuperCalc*, *WordStar*, and *dBASE II*, Campbell says. "For home office personnel, the results of disk-based training were extremely good."

Campbell rewrites all software programs used in company training for new users. "In a way you could say we spoonfeed these employees," she says, but the effort pays off. "I've used training software that comes with the computer. But without the additional help of a human tutor, these training packages are not that helpful."

Walt Milhous, manager of marketing for Teichert, one of the largest construction companies in northern California, has been much more successful using interactive disk-based training for employees working on the firm's 15 IBM PCs. "We have used Cdex's *The Instructor* for a basic overview of the IBM PC, and IBM's own introductory disk that comes with the PC. We have found these disks useful for novices that haven't used the machine before. Disks help get new users over their initial fear of the machine. They strike keys and discover how much fun it is to

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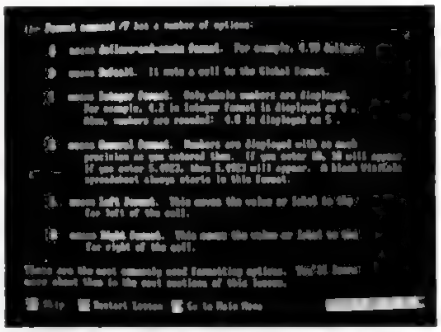
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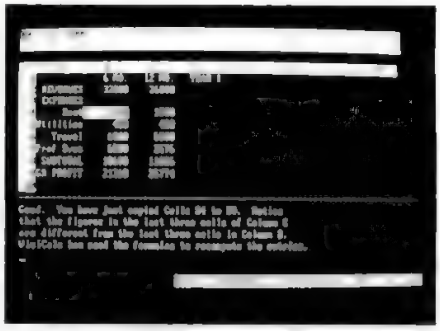
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DISK TUTORIALS



VisiCorp's *VisiTutor for VisiCalc* tutorial provides screens such as this one to describe various command options.



This screen from *ATI Training Power for VisiCalc* tutors the user in preparing financial statements.

use the computer."

Milhous says his firm's main use of computers is for inventory and spreadsheet applications. "We started out with *VisiCalc*, but have almost completely switched to Lotus' *1-2-3*, which has its own tutor."

Milhous also notes that disk-based tutorials are a convenient way employees can squeeze training into their free moments during the normal work day. "People usually allocate an hour or two at a time—sometimes four. They can absorb only so much per day."

Quasi-Human Teachers

Disk-based tutorials, like human teachers, give encouraging feedback to students who come up with the right answers and progress through their software lessons without a hitch. A student learning *VisiCalc* with *VisiTutor* might be patted on the head with any of the following comments:

DISK TUTORIALS

"good," "very good," "excellent," "fantastic," or "fine." Like those from human tutors, these comments make a student feel he is making progress, and will eventually master the material.

On the other hand, interacting with a computer can be frustrating. While these programs don't reach out and rap your knuckles with a ruler, their responses to inappropriate answers can be discouraging. Consider these comments from the Cdex trainer for *VisiCalc:* "Sorry, (user's name), you have entered an unanticipated keystroke. Please try again. Enter 1,2,3, or 0," or "That's not it!" or "That's an interesting answer, but it doesn't quite do what needs to be done," or "I have been unsuccessful in getting the idea across to you," followed by a suggestion to take the lesson again.

Dunipace, who counts Sacramento ComputerLand as one of her consulting clients, says there is plenty of room for human teachers to supplement the training offered in disk-based tutorials. A purchaser of a software package such as *1-2-3* at either of the two Sacramento-area ComputerLand stores is entitled to a free class for two people in how to get the most out of the package. Noting that *1-2-3* retails for about $485, Dunipace says, "I don't feel buyers should be paying for something they can learn with their tutorials at home.

"In my classes," she says, "I tend to focus on things that may be in the tutorial, but may not be explained clearly, or on features that aren't mentioned at all. The tutorial presents *1-2-3* more as a database program than a spreadsheet."

Although some software manufacturers claim that inclusion of a Help command is a substitute for training, it is actually a completely different animal. A Help command tells the user how to react to disasters, while tutorials attempt to anticipate and avoid these disasters. These "help" explanations are necessarily brief and may not meet the user's needs at all.

A good disk tutorial allows users to see and understand features of the software

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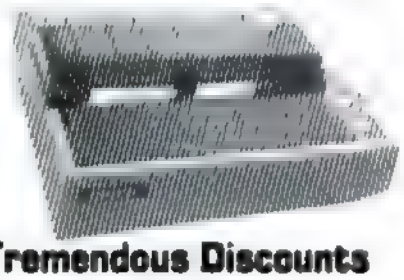
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DISK TUTORIALS

before they can become confused by it.

Typing with Handcuffs?

There are some other drawbacks to disk-based tutorials. A user can't actually do work with a program while learning it with a tutorial. For example, users can't build a spreadsheet while using one of the many *VisiCalc* tutorials on the market. "You swap in the trainer and swap out the application. They're mutually exclusive," says software developer Judd, adding that this design may change in the future.

At worst, a tutorial merely becomes a typing test, in which the user is praised for typing in a proper spot whatever is suggested. Following commands is not learning, however. Without realizing it, users may type merrily through the lesson, earning praise at every turn, and only realize when it's over that they haven't actually absorbed the information presented.

Worse, in a way, is the *1-2-3* tutorial's approach to the typing problem. While the directions tell the user to move the cursor around and type various characters, merely hitting the spacebar after each set of instructions will move the program forward. Once a student discovers this feature, it can be a lazy way to advance the lesson quickly, without bothering to absorb it.

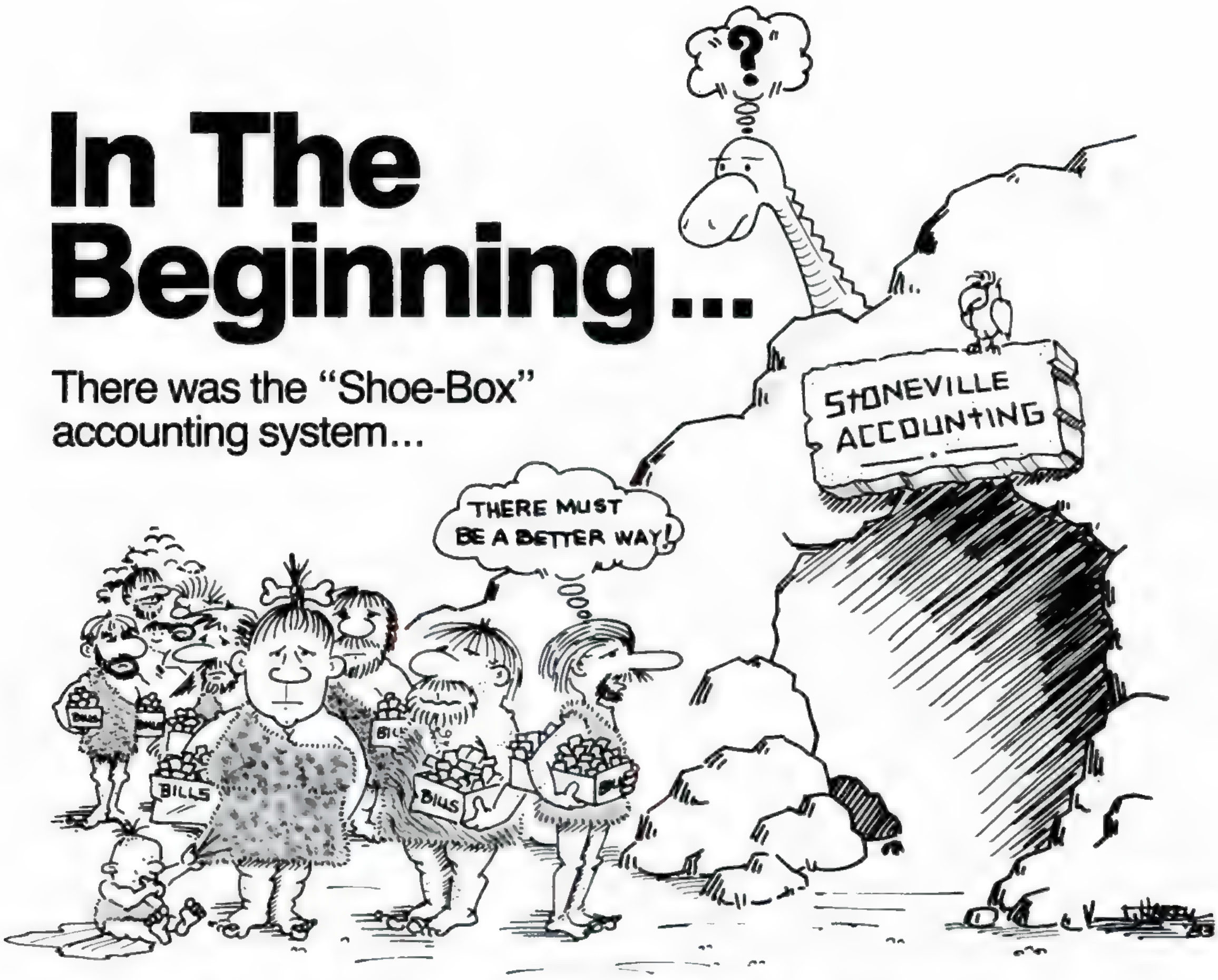
Some tutorials handcuff the user by accepting only one "right" answer in any situation. If the user chooses a different answer than the one designated as "correct," the reason why it's wrong is seldom explained.

The best way for a novice to learn a new progam may depend on a person's individual situation. If classes are available free with a software purchase and are easily accessible, they may be the easiest method for a user to get the information and training.

On the other hand, there's no guarantee that any human teacher will be competent. Disk tutorials can give students a great "I did it myself" sense of satisfaction. These programs can make learning fun by giving the user control his own education. ■

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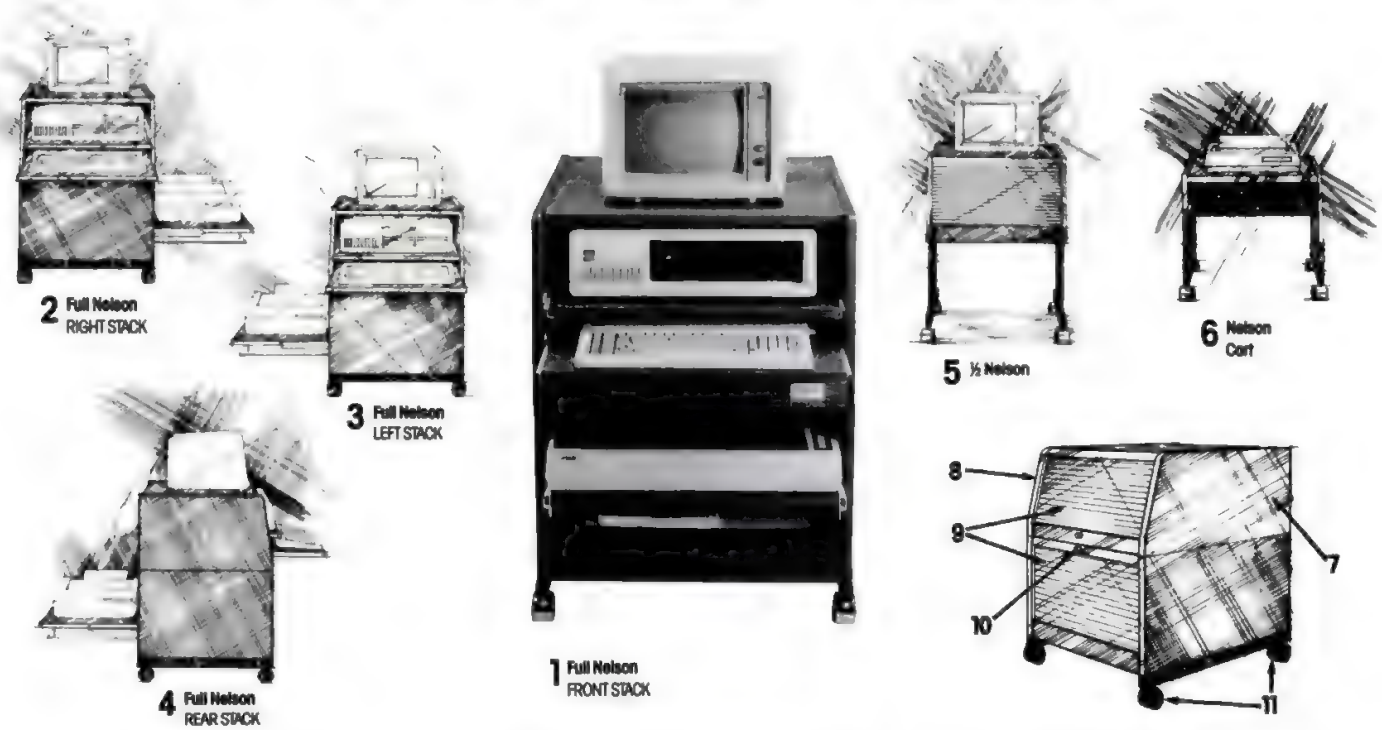
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CIRCLE 351 ON READER SERVICE CARD

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3 Full Nelson LEFT STACK

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4 Full Nelson REAR STACK

This is the configuration for those with rare and unusual needs. The Nelson not only follows you around, but adapts to any reasonable situation you put it into. Plus, if you have many offices with many separate computers to account for, the Nelson flexibility simplifies your task of fitting computers into multiple space requirements.

5 ½ Nelson

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6 Nelson Cart

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7–11 Details, Details, Details.

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12 How about you?

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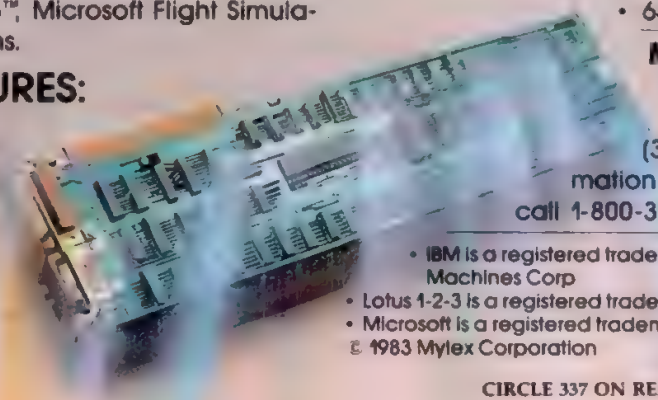


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CIRCLE 337 ON READER SERVICE CARD

BULL????



A lot of it is being slung around! Clearly, you need a lot more than just an index finger and an elbow to meaningfully use a computer. Is having a cluttered screen of options and windows easier? After the first blush of novelty and gimmickry and puffery wears off, is it really going to be easier and better? One thing is for sure - *it is going to take a lot of time to shake these new systems out and make them functional in user environments.*

For those who want to have an easy to use, organized, efficient computer operation now, **SysteMate is the answer!** SysteMate is an user friendly menu driven interface between PC-DOS and applications. When you complete your work with Lotus or other applications, you exit back to a SysteMate menu instead of DOS. Look below — see how clear and simple the screen is!

If you are up and running, you can use your software with SysteMate to eliminate the redundant "mickey mousing" around with PC-DOS. If you are just getting started, you can use SysteMate and other software to set up a streamlined, functional system. In either case, it is amazingly easy.

Systemate allows an unlimited number of nested menus. You set up the menus to your liking. To run an application, you just press a key. SysteMate provides the linkages. SysteMate does not effect PC-DOS or the application programs, it just makes it a lot easier to use them.

At last, SysteMate enables DISKETTE SYSTEM users to set up their computer operations the way they should be set up. SysteMate allows screen displayed pre-execution and post-execution operating instructions for each menu item. SysteMate can remind you which diskettes to mount, and even check the labels to make sure the right diskette is mounted. SysteMate can instruct the operator when and how to do those things necessary for an organized efficient system. It's your cookbook, do it your way!

For HARD DISK SYSTEM users, SysteMate is a dream come true. You can effortlessly navigate between your various applications without any nonsense. And wonder of wonders, if your DOS version allows for it, you can **actually** have an efficient, easy to use, tree structured directory system.

SysteMate is no BULL!!!! It works on the IBM-PC, IBM-PCjr., IBM-XT, COMPAQ, and other PC-DOS systems. It's available now for only $149.95,* complete. Ask for it at your dealer, or call us direct. Let us help make things easier by providing you with **SysteMate,** a better way!



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The Typesetter Connection

A growing number of typographers across the country are teaming up PCs with typesetting equipment to produce newsletters and brochures with a professional appearance.

Ray Porter has two late-model microprocessor-driven typesetting machines with two terminals each, but when he sits down at a keyboard it's usually attached to an IBM PC.

Porter is one of a growing number of typographers who are teaming up PCs with typesetters. They have adapted standard programs written for other purposes, writing original software and buying or building "black boxes" or dedicated systems to join incompatible hardware. These typographers are using micros to convert their older typesetters into state-of-the-art equipment.

Meanwhile, businesses and individuals who write copy to be typeset are finding that using a PC can provide more control over the final appearance, security, and turnaround time of their newsletters, brochures, and annual reports. They are capturing the original keystrokes on a PC's floppy disk and sending them via phone or disk to printers or to their own in-house typesetters.

The result is a merging of two technologies: word processing and typesetting computer systems. "Despite the head start newspapers had in using mainframe and minicomputer systems with front-end phototypesetters, typesetting systems will be coming into the newsroom rather than the other way around," predicted George Nason, marketing manager and former system manager and architect for Harris Corporation, which manufactures phototypesetters.

Cost Effective

"Micros are probably the most cost-effective way of providing input to phototypesetters," said Michael Kleper, professor of visual communications at Rochester Institute of Technology and editor of *The Digest of Information on Phototypesetting*. They also offer considerable support because of their broad user base, he wrote in an article, titled "Micro Update," for the aforementioned publication. "The great number of individuals using particular microcomputers has resulted in many low-cost software packages, some of which are especially useful in typesetting (spell checkers, for example). The importance of abundant high-quality software cannot be overemphasized. The resources of typesetting vendor software development teams cannot begin to approach this phenomenon."

Other general-purpose PC software can be useful, too. Porter Graphics, Inc., in Santa Ana, California, created a typeset directory using *dBASE II*. "We listed a

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Or for the name of your nearest dealer, just call 1-800-4-FRIDAY, ext. 204.

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CIRCLE 107 ON READER SERVICE CARD

bunch of hotels for travel agents and ran it through the database program. We wrote another program to translate that into code that the MCS (Compugraphic's Modular Composition System 8400) would understand, and then telecommunicated that to the MCS," Porter said.

On the opposite coast, the typographer Pastore Depamphilis, Rampone (PDR) in New York City uses IBM PCs to handle telecommunications to typesetters from various users, some of whom are entering data with their own PCs. Porter Graphics uses *PC-Talk* for that chore, while PDR uses its own software. "We have clients such as IBM, Texaco, Exxon, W.R. Grace, and Morgan Guaranty—all of the major national corporations and internationals," said Ron Corcoran, PDR's director of research and development. "They do keyboarding themselves on various word processors. Some of them have IBM PCs, and these customers will either transmit the data to us, or in some cases give us the disks. We in turn have the hardware here—the PC, among many other things—where we take the data and download it into our front-end system. We use the PC to capture the data.

PCs Write about PCs

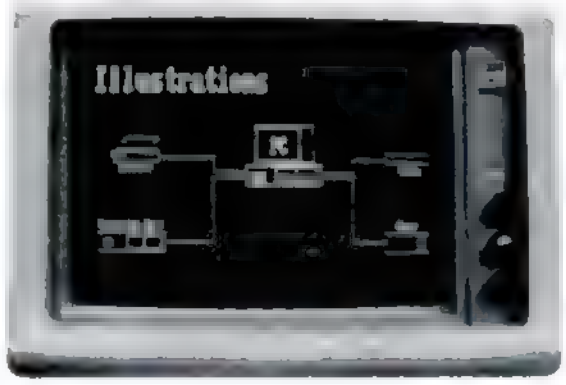
PCs are also being used as inputting devices at Muir Cornelius Moore (MCM), a 5-year-old New York City advertising agency. This agency has had the sales promotion account for the IBM Personal Computer since May 1980; here, PCs are being used to write about PCs.

"All of our copywriters who work on the IBM PC account have their own PCs, on which they actually write copy," said Hil Leibe, executive vice president and general manager of the agency's systems division. The agency produces copy-intensive publications, such as *The Guide to Personal Computer Offerings from IBM*, 112 pages of description of IBM software for the PC, XT, and PC*jr;* sales brochures for those three machines' hardware and software; and *Feedback*, a monthly newsletter for IBM PC dealers.

All the copywriters use *EasyWriter II*, which makes it easy to share data diskettes. The agency also transmits copy to IBM's Boca Raton office via modem.

Despite these computerized conversations between agency and client, until recently MCM was sending printouts or typewritten copy to New York type houses to be set. But by the fall of 1983, MCM had begun using a PC cabled to a Mergenthaler Linotype CRTronic 200 typesetter, which has its own microprocessor. Ac-

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cording to Bob Reul, vice president and production director, copywriters now transmit copy to the PC, coupled to the Mergenthaler via modem, or drop off floppies containing data to be typeset.

> The PC allows you to update equipment without a huge expenditure.

Despite higher-than-expected start-up costs and a decision to pass on savings to its customers, MCM expects to clear a 50 percent profit in 1984 from the in-house typesetting arrangement.

An arrangement like MCM's is obviously not for everyone. A simple setup mating a PC and an aging Compugraphic phototypesetter met the needs of the art department at Detroit's WXYZ-TV, where the artists are the typesetters.

A Task to Keep the PC Busy

"They don't keyboard every day, so they need a system that can be turned off for several days, and will quickly resume functioning when needed," said Art Director Jack Flechsig. Consultant Lou Glassheim put together a package coupling a PC running *EasyWriter* 1.1 to the Compugraphic through an interface box manufactured by First Main Computer of Bedford, Texas. It allows the artists to produce newspaper advertisements, brochures, simple printing jobs, and name tags for groups that tour the station.

"After I bought the typesetting machine about 8 years ago, Compugraphic updated its equipment to include pretty much the same thing. It has a video screen and a memory and a disk drive all built in. That's probably the way a lot of people went—they just traded up to a more recent machine. But the PC allows you to update the other equipment without a huge expenditure. And in many ways it's better because you can use the PC for other purposes, too," Flechsig said.

However, he admitted, his department hasn't used the PC for anything but typesetting, because that task keeps the machine busy all the time.

At Technique Learning Corporation, a subsidiary of Oceana Publications, which specializes in publications on international law and affairs, personal computers made their debut in the mid-seventies. "We were already at a point where a lot of our authors and editors were using dedicated word processors. Many of them were aca-

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BULLETIN

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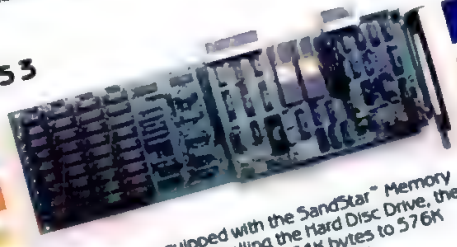
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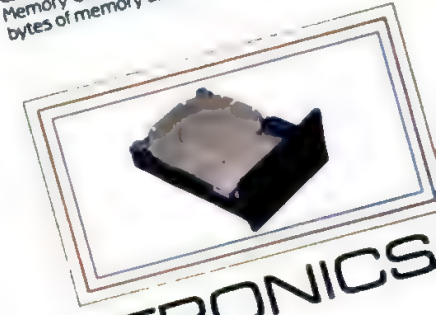


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demics at large universities and had this equipment," Dave Cohen explained. "Most of their copy was not in machine-readable form, so we were still using hard copy, which had to be rekeyboarded."

Technique Learning began using Apples to provide input to Oceana's AM Varityper Comp/Edit typesetters. "We had already been using a computer to prepare the copy for about a year without any problems. Then, the PC came out, and, within a month, we had one here. I checked its compatibility with our typesetting equipment, and it worked like a champ. We use standard word processing programs like *WordStar* and *EasyWriter*. As long as the customer sends me a disk that can be read on the PC, we can typeset from it," explained Cohen.

For other formats, he relies on a Cromwell Context Z-80-based microcomputer system to perform what he calls "basically a glorified search and replace" to convert the author's coding to typesetter-ready copy.

The author is given a list of simple codes. "For instance, we'll tell him that at the beginning of a paragraph he must use an asterisk with a number 1. At the end of a paragraph he has to use an asterisk with a number 2; at section headings he must use an asterisk with a number 3. It is a simple, straightforward, uncomplicated coding system."

Trouble with Machines

Before Technique Learning got the Context, it had trouble with the word-processed copy. "We wheeled a lot of machines around and strung wires among them—we'd load files into The Source and then download them with another system. There are all sorts of peculiar ways to get around compatibility problems, if you put your mind to it," explained Cohen.

Sam Blum, editor and publisher of *TypeWorld*, a newspaper for the word processing and typesetting industries, has had his troubles, too. "Getting the information from micro to typesetter is one of the biggest problems. I'll say without a doubt that many people are setting type from IBM PCs right now, but how they're getting from here to there, I don't know."

TypeWorld has become a resource for people who want to use their micros to typeset copy, and Blum receives many phone calls on this subject. "I know of one company in New York where one department has an IBM PC and another has a Wang phototypesetter. The company wanted to know how to get from the IBM PC to the Wang phototypesetter," he said. "There's only one solution—have you got a modem? Got telecommunications on the Wang? Phone it in from one floor to the other," advised Blum.

There are all sorts of peculiar ways to get around compatibility problems, if you put your mind to it.

What does the future hold for the PC/typesetter connection? "I believe you'll see a trend in the market within the next 6 months to a year toward typesetting packages for micros," said Joe Blakely, marketing support specialist for communications for Itek Graphic Systems, a typesetter manufacturer. "One of the requirements for using these packages will be to know something about typesetting. That's the way it is now and will be for some time. But eventually, I'm sure simpler packages will become available."

However, Diana Levine, who runs Diana Levine Computer Typesetting and its subsidiary, Dial-a-Typesetter, in Pelham, New York, said she gives only a few instructions to her clients at first. She has been receiving copy over the telephone for 4 years, and eight of her customers are using IBM PCs. "We can, within a couple of minutes, prepare a customer to send us a job via modem. We start out with simple codes so customers won't panic.

"The one thing we have discovered is that once they have done it a few times, most people are anxious to assume more control. We train people in point sizes (which are used to specify the size of type), and they code the manuscript appropriately. You can produce sophisticated-looking documents, even though you are sitting in front of your PC just looking at a conglomeration of codes."

New Packages

For those who would like to see something more than a conglomeration of codes, software packages that hyphenate, justify, and paginate copy prepared on IBM PCs using existing word processing software are now being exhibited at trade shows. "Up to now," said Blum, "Nobody, to my knowledge, has written a hyphenation and justification module to be used on a PC for typesetting. They really don't have to, because most modern typesetters have their own logic for these steps."

But the new packages promise the ability to preview a page on a PC screen exactly as it will be printed. Bill Breeze, chief operating officer and vice president of Cromwell Graphics Systems, calls these packages "possibly the most significant new development in typesetting—an extremely important development in the personal computer world. Composition software has existed in the past, but it was never very good.

"We're still maybe a year or two away from a program that will work with all these different systems," said Technique Learning's Cohen, "but it is definitely coming. Some of the typesetters are just starting to realize that they have a sizable untapped market out there. They haven't given much thought to all of the time, energy, and millions of keystrokes that are being put into micros. The realization is just starting to hit home."

"A phototypesetter is no more, nor less, than an alternative printer," concluded Blum. Perhaps new software products for the PC will help make that so. ■

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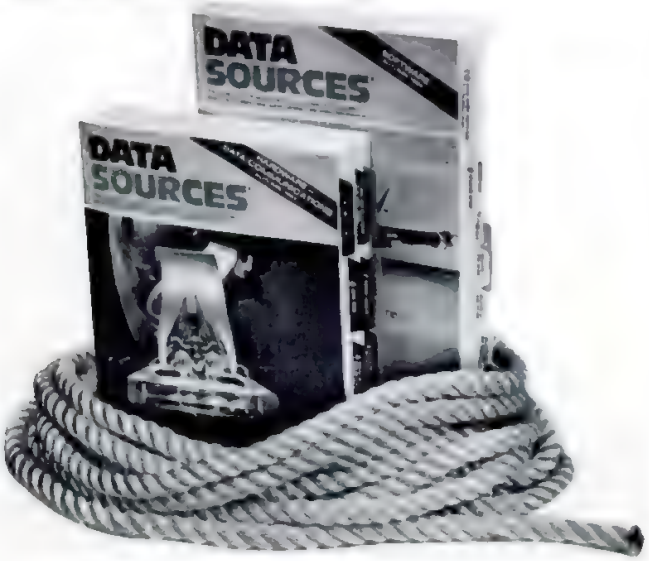
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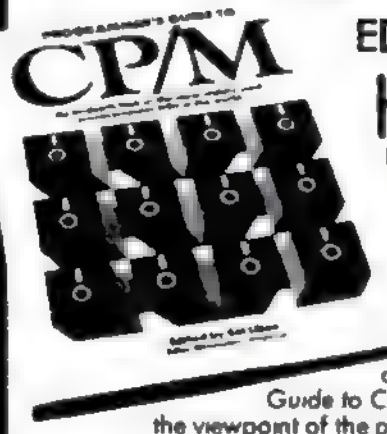
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EDITED BY SOL LIBES

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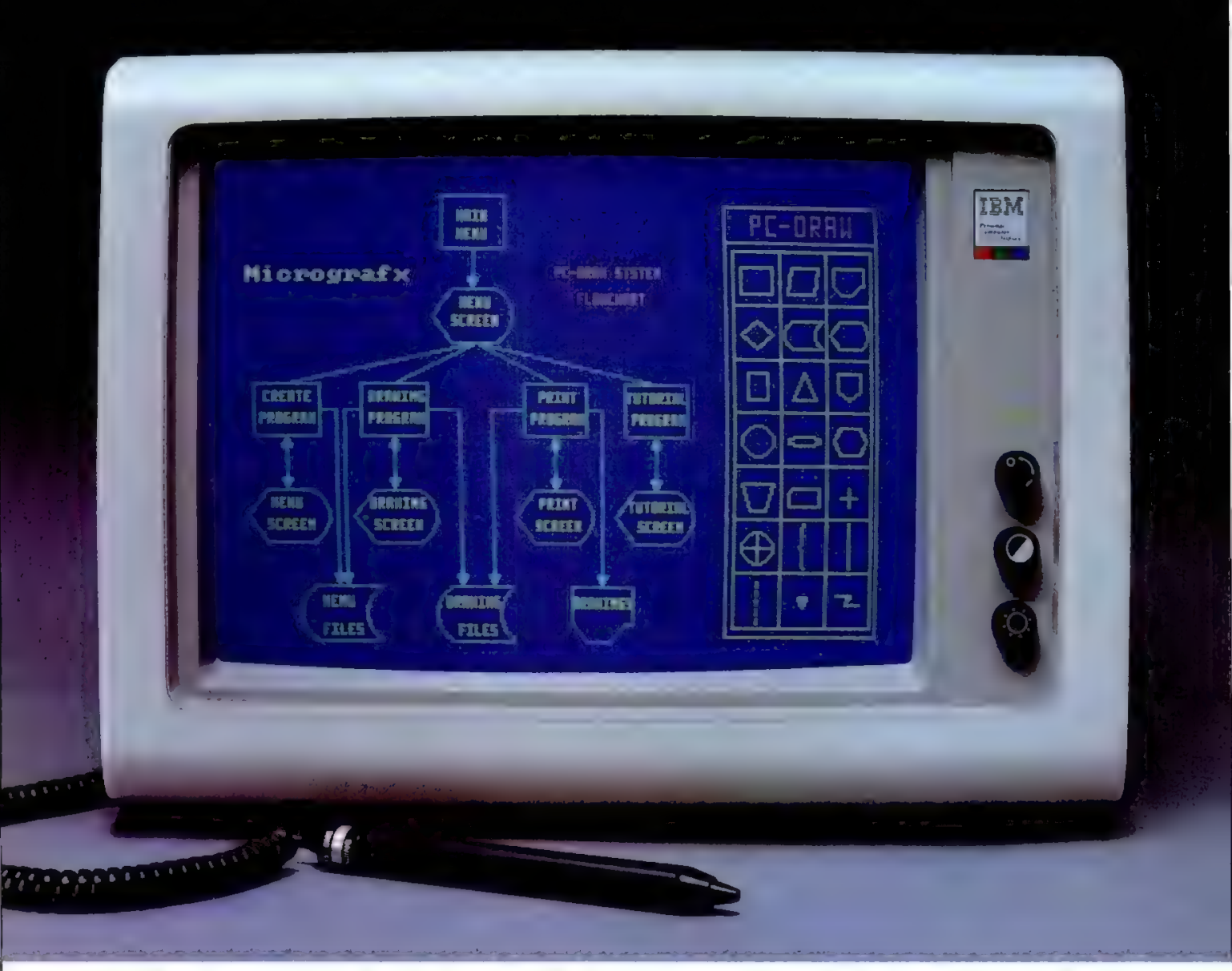
The Pick Operating System structures data in the same way that people think. It was created to please programmers and end users alike and is coming soon to a PC near you.

In the very near future, a little-known operating system will be making its debut on the IBM PC. The Pick System, one of the user-friendly fourth generation operating environments, will fill a growing need in personal and business microcomputing. It combines the speed and power of a virtual memory mainframe with the simplicity and ease of use of a personal computer. For many applications it is clearly superior to MS-DOS and Unix.

Many microcomputer users are baffled by the technical aspects of their machines. They want a computer so simple to use that it will let them concentrate on the job at hand instead of the computer itself. The Pick System has long been recognized for its ability to turn these people into enthusiastic computer users.

The Pick System is not new. It was first developed as an application package by Don Nelson and Dick Pick, two programmers at TRW, in the late sixties. The package was designed with an English-language information storage and retrieval approach and was first used to keep track of project activities and accounting. The system was refined into the Generalized Information Retrieval System (GIRLS) at the University of California at Irvine. During the late sixties it was run on a variety of mainframes, including GE635, IBM 7094, and the Xerox Sigma 7.

As an application package, the system wasn't well suited to run on top of an operating system. So in the early seventies, the entire system was rewritten from scratch in microcode, as C/PM and DOS are written today, turning it into an entire operating system. This approach gave the Pick environment an unusual degree of portability. Since 1973, Dick Pick's company, Pick Systems, Inc., has made a small fortune by implementing the Pick Operating System on a variety of powerful 16-bit minicomputers. However, the Pick System will be implemented on only one



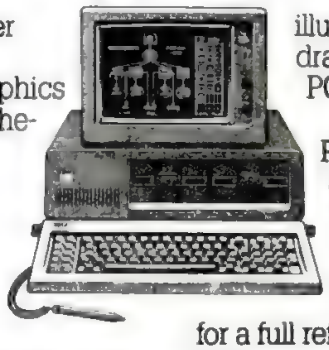
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microcomputer—the IBM PC, which, in the eyes of Dick Pick, represents a more serious, business-oriented approach to personal computing.

Politely Transparent

To most of us, the term "operating system" describes a part of our computers that we rarely use. An operating system is a program that is started up by the computer when it is turned on. It checks out the system, initializes all the devices, and controls them during each task. The operating system has a direct effect on the speed and efficiency of peripheral devices such as the disk drives, and it determines the size and type of files that the computer will support. An operating system manages the data throughout the system, both in the computer, and in external storage. Some provide special functions, or "utilities," to help the computer user access and process data. Some of these utilities are intrinsic to the way the operating system stores the data; others are customized by the system developer to provide an extra measure of convenience to the ultimate users of the programs. Some of the better operating systems will even seem to reorganize the data as the user or application program needs the information. These systems have the ability to read, rearrange, and reformat data as needed and are often said to have database management capabilities. This type of system can make the difference between an easy programming chore and mechanized drudgery.

However, for the most part, computer users merely pass through the operating system on the way to an application program. Only developers use the operating system a great deal. A good operating system should therefore be "politely transparent" to the user, who is intent on carrying out a specific computing task. It should provide quick and quiet service to the application program by facilitating data processing, preserving and protecting data, and by providing graceful, controlled handling of application tasks or hardware errors. In one sense an operating system must be personable to be useful on a personal computer. The Pick Operating System provides the development programmer with a sophisticated, utility-laden programming environment, and, at the same time, it gives the computer user a politely transparent relational database.

The Pick Operating System does these things by simplifying the user's environment and taking over much of the work itself. It is designed for transportable application programs and uses a data structure similar to Software Arts' Data Interchange Format (DIF). The Pick Sys-

Virtual Memory Management

With the Pick System, there's more room on the inside than on the outside.

The term "virtual memory management" describes the way the Pick system provides each task with as much "real" memory as is necessary to complete the task, regardless of the computer's size. This is easier than it sounds.

Virtual memory management refers to the method of utilizing real system memory in a way that seems to enter much more data than it can physically hold. This results in faster application programs, since they can be written as if the entire data file were available in main memory at the same time.

The Pick Operating System accomplishes this trick by separating the low main memory space into small sections reserved for "pages," and a table of page "addresses." When an application program or a user requests data from a disk file, the system retrieves more than just one record. At least 512 bytes of data, called a "page," are read from the disk file. The requested record is delivered to the application program, and the page is retained in a reserved section of main memory. The next time a record is requested from a file, the system first checks main memory to see if the record is in one of the pages retained there. If so, the system returns the requested record at a speed several hundred times faster than if the record had to be read from disk. If not, the system gets another 512-byte page from the disk file and retains it in main memory as well as the first page. The system keeps track of the pages that were most recently used; when data is requested and all the spaces are filled, the system replaces the page that was used least with a new page.

Paging Through Memory

Expressed in another way, the Pick Operating System "pages" files into physical memory as needed, and retains the pages most recently used for subsequent access requests. Depending on the application and the size of the data records, most accesses are satisfied from main memory. In any case, application programs are relieved of the burden of determining a record number, reading a disk file, checking for an end-of-file mark, and separating the record into fields. On a Pick Operating System, the program reads a record, and the operating system instantly delivers the record as a one-dimensional array, with each field as a value.

Because a computer equipped with the Pick Operating System acts as if virtually all the disk storage was in main memory at the same time, these systems are referred to as "virtual memory managers" or "virtual machines." There are many advantages for disk and system memory usage made possible by this environment, especially when a native programming language, such as the Pick version of BASIC, takes advantage of this structure. —S.V. and J.S.

tem makes the handling of ASCII files easier by performing all the data management tasks for the user and for the programmer.

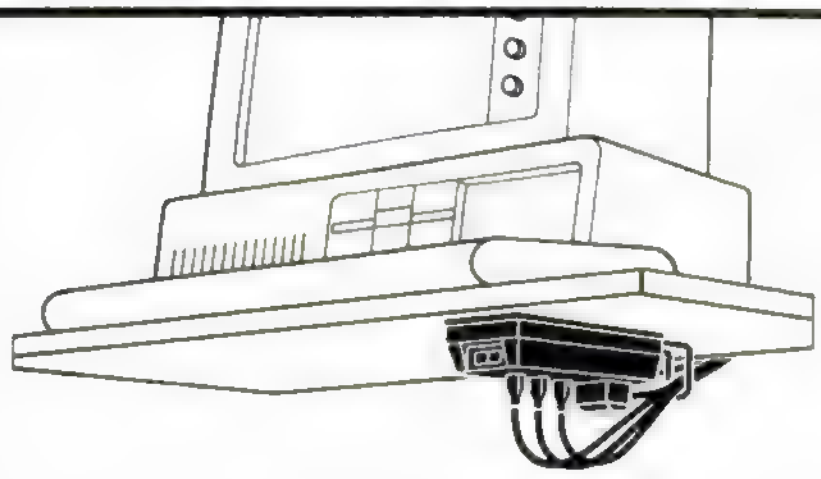
Unique Memory and Files

First, the Pick system uses a virtual memory management scheme to automatically allocate and change storage for the user. Fields, records, and files are completely variable in size and format. "Virtual memory management" means that the data in a Pick system is written on whatever storage is available to the system and is then automatically retrieved, converted, formatted, and delivered to the program or output device. More importantly, if the data is changed in any way, the field, record, and file are dynamically expanded or contracted and rewritten to storage. In other words, the Pick System relieves the user and programmer of all data storage headaches.

The files in a Pick system are unique, too. The disk space is divided into "accounts," each with an associated set of files. These accounts are similar to the directories in the PC-DOS 2.0 tree structures, but the similarity ends there.

Each file in the Pick system is actually two physical files. The first file, called a dictionary, contains records that describe the fields within the data file. The dictionary always has one record that points to the location of the data file in memory. This allows the operating system to access data by looking up the definitions of fields in a dictionary, locating the data file, and retrieving precisely the fields requested in the format specified in the dictionary definition. The whole process is performed at operating system speed by the operating system itself. It is made possible by a departure from traditional data storage techniques that is fairly simple in operation but difficult to describe.

In the Pick Operating System, the fields and records vary in size and are accessed by their individual names. Records are not stored by numbers, yet no indexes are maintained as to the record locations. Instead, each record or "item" in a file has a unique, user-assigned name that is used to calculate the physical location of the record. Any string of characters can be used as a record ID. The name can be a number, such as "256," but "TOM," "JULY 25, 1983," and "FILE-RECORD-1.2," for example, are preferable record IDs. This means that a program doesn't need a record number to access a particular record; instead, it needs only the unique name of that record,



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which never changes.

Similarly, the definitions of the fields in a data file are recorded by the name of the field. These records are in a dictionary file, which is accessed and edited like any data file. A field in a data file named "EMPLOYEES" might be called "CITY." A dictionary record named CITY will be stored in the EMPLOYEES dictionary file, perhaps defining the fourth field of every record in the EMPLOYEES file, or perhaps just the first word in the fourth field of every record. If a user or a program calls for the CITY from the "TOM" record in the EMPLOYEES file, the system will locate the file, the record, and the fourth field and retrieve the CITY and deliver it to a user or program. Since the dictionary/file structure is inherent to all Pick files, the system can perform this retrieval as an operating system function and at operating system speed, whenever data is needed from virtual memory.

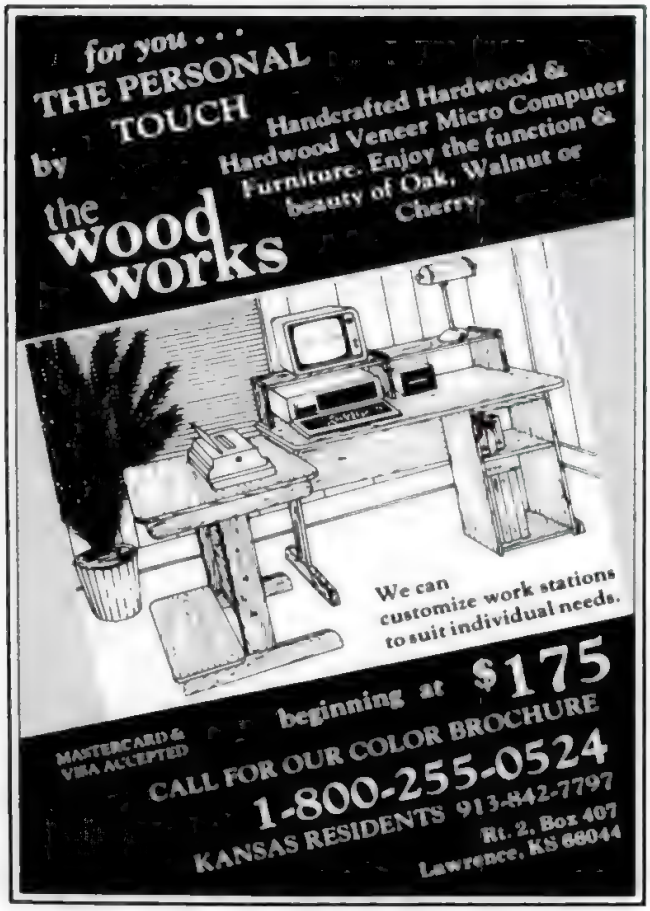
Picking and Choosing

Through the virtual memory manager, Pick uses this file structure to locate and access data across directories, or "accounts," as they are called in the Pick world. Because the data can be located by name, you automatically build a relational database every time a file is defined and records are stored.

This relational approach to data is what makes Pick so easy to use. A dictionary definition can do much more than simply point to a data field. It can reformat, convert, or perform a mathematical operation on the data as it is being retrieved. The definition can even specify that the data must be combined, or "related," in specific ways with other fields in the same record or in other records in other files. A definition in a dictionary will define a relationship as a "translation."

Translations work like this: After retrieving a field, the dictionary definition can specify that the value retrieved is to be used as a record ID in another file and that one of the fields from the new record is to be used in place of the value originally retrieved. For example, a CITY of "CHI" could be automatically translated to "Chicago" through a file of city abbreviations. The definition can even call for the target value to be further translated, or reformatted, or assembled with other fields. Our example definition could call for the value to be even further translated, through another file of city names, to "Illinois," and then concatenated together as "Chicago, Illinois".

A Pick System field can be called by a





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predefined name, and the system can deliver an entire logical record composed of values from several related files in widely separated accounts or directories. It provides a true "logical view" of information, without regard to where the data is physically stored in the system.

Here is an example of how you might use this Pick architecture. Let's say that you define a file in which each record consists of a name, a social security number, and a phone number. This file is useful for sorting and selecting people according to phone exchanges. Next, you create a file of addresses, which are also filed under a name, but are composed of street, city, and zip code. A third file contains records filed under the last four digits of each phone number, with phone type, color, and location code within the building. A fourth file might contain only zip codes, with state names recorded as a field under a record ID of "ZIP CODE." Other records in this general-purpose translation file would have record IDs of building location codes with translations into location names. Each file has a properly constructed dictionary, with simple definitions that refer to data across files.

Suppose you need to know all the people from a specific city and state in order by name within the building location. You enter a sentence like this:

```
LIST THE PEOPLE WITH A CITY
OF ''CHICAGO''
DISPLAYING NAME PHONE
LOCATION
```

A Pick utility called ACCESS processes this sentence. It accesses the dictionaries and the files, relates the data, performs the translations and conversions, and displays a formatted list of the individuals on the screen or on the printout, as if all the data were available in one file and one physical record. Figure 1 is a graphic representation of this process.

With a little practice, you can do much more. The related fields can be defined as simple values, or defined with complex conversions and reformatting. ACCESS

PICK

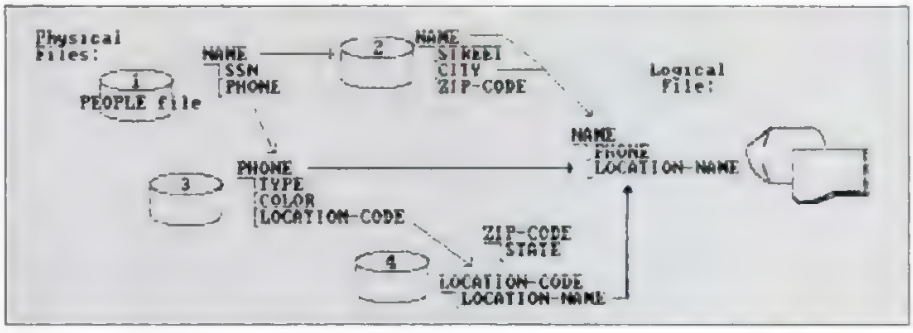


Figure 1: *An illustration of how the Pick System executes the command, LIST THE PEOPLE WITH A CITY OF "CHICAGO" DISPLAYING NAME PHONE LOCATION.*

will also sort on any combination of sort keys as long as the sentence contains one of the phrases "BY" or "BY-DSND" in front of the field's name. It can also handle a SELECT sentence by "pipelining" and "filtering" the data. Here the system either selects or selects and sorts, and sets up a temporary file for the records selected, submitting them to an application program one at a time. These relational database aspects of the system make all data handling very simple.

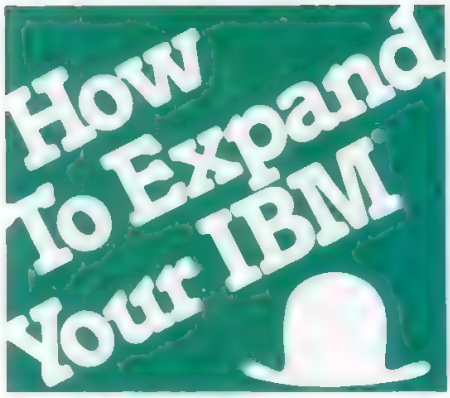
Built-in Utilities

The Pick Operating System has a full complement of built-in utilities to take advantage of the dictionary/data file structure. EDITOR, a built-in line editor, can locate and modify any record in any file in the system including the system dictionary, any file dictionary, and any data file. It is very useful for creating dictionary definitions and editing data. Two more powerful utilities are the RUNOFF text editor and the JET word processor. But the most powerful feature of the Pick Operating System is the Pick/BASIC language, which incorporates the database access and retrieval capabilities into the command set. With this, accessing, reading, and storing data becomes simple, one-statement operations. The BASIC processor provides automatic compilation and link-editing of BASIC programs, along with an integrated macro assembler.

All Pick system utilities are activated in direct communication with the system, similar to PC-DOS, at the wedge right (>) prompt. The system supports a wide range of verbs, called the Terminal Control Language, or TCL. The user can create new customized verbs by combining TCL verbs, BASIC programs, and even assembly language routines into a "procedure," or PROC. PROCs, which are similar to PC-DOS batch files, reside with the TCL verbs in an Account Master Dictionary. A PROC is executed whenever the name of the PROC is keyed or passed to TCL.

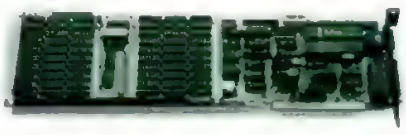
These features are exciting when applied in combination to practical business and personal computing. The natural data structure is similar to the way most people think of sets of information and thus lets users focus on the data instead of its physical format. When combined with an English language interface and the ability to write complex batch files, the system lets users talk in a natural or even a personally customized language. The result is a personal computing environment in which users can concentrate on the task to be accomplished, instead of on how to "get the computer to do it." After years of providing such an environment on larger computers, the Pick Operating System is on its way for the IBM PC. Its features and capabilities make it a logical choice. ■

Steve VanArsdale has designed, programmed, and operated Pick Operating Systems since 1976 as a consultant and systems manager. Jonathan Sisk, a consultant, lecturer, and teacher, is the author and publisher of the PICK Pocket Guide.



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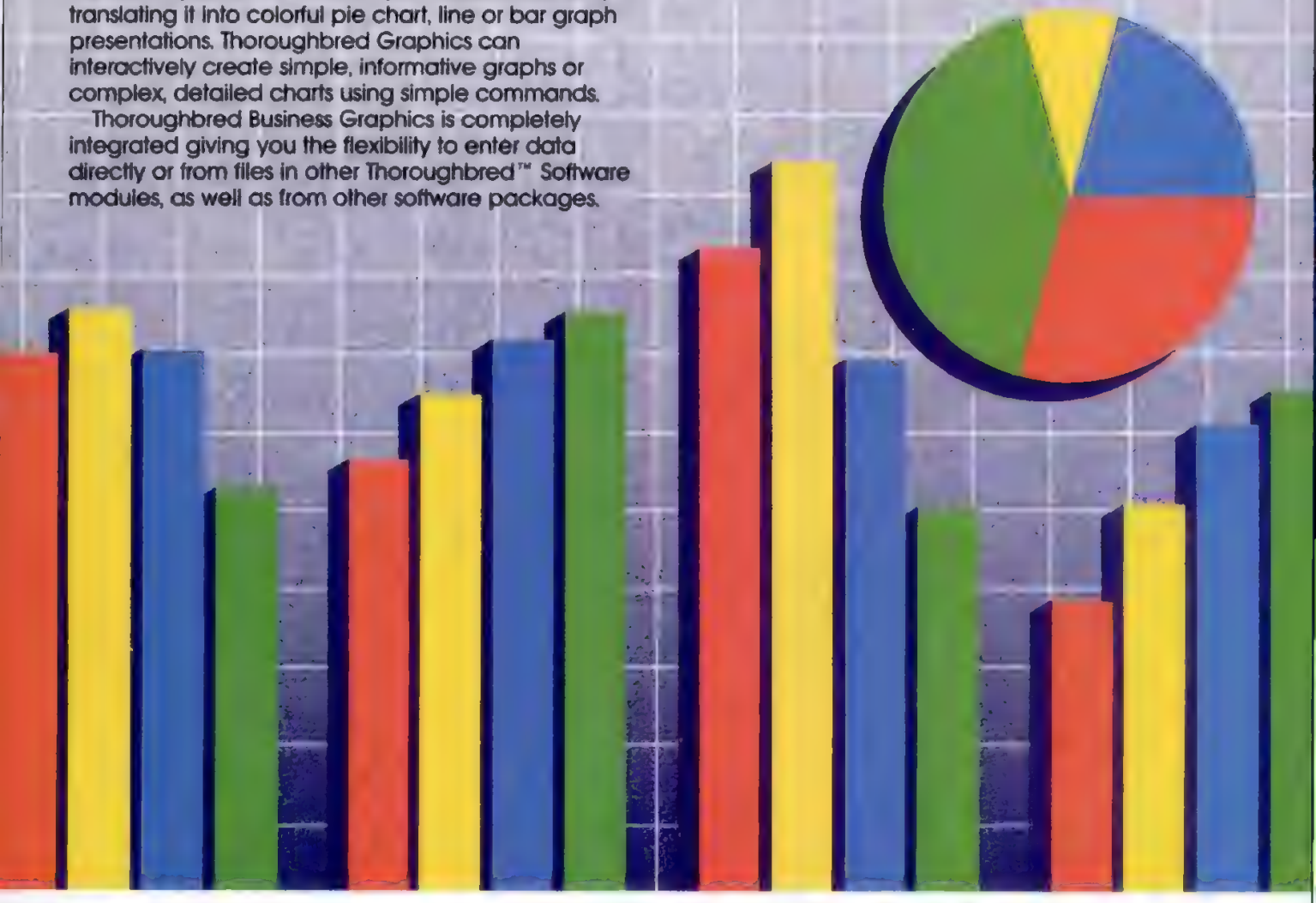
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Silicon Valley Days, 1983

The soap opera of microcomputers continued to take shape last year. Its talented cast of characters featured TI, Atari, Commodore, Coleco, Mattel, and—of course—IBM.

In January, while most of us were looking forward to 1984 with a bit of uneasiness, much of the computer industry was looking backward at 1983 with great relief.

The past year may well go down in the annals of the very young history of microcomputerdom as the Silicon Valley version of "Days of Our Lives." (Perhaps we should call it "Edge of Disk." On the other hand, I'm told that Texas is very much in these days, what with the popularity of J.R. and the rest of the characters on "Dallas." Maybe the best title would be "TI's Hope.")

Anyhow, though George Orwell may have produced the ultimate brooding depiction of dominator and dominated, doubletalk and doublethink, it took the amazing microcomputer industry to make these topics into a tragicomedic soap opera.

Now remember, the story you are about to read is true. None of the names have been changed to protect the innocent.

TI Kicks Off

The first big event of the year was the Winter Consumer Electronics Show whereat Texas Instruments announced the exciting new TI-99/2 microcomputer. This device was going to build on the tremendous success and potential of the TI-99/4A microcomputer.



Corey Sandler

Let's stop for a minute and consider the astounding history of the TI-99/4A. (On this I need to thank Future Computing, Inc., for its fine work in tracking the checkered history of the industry.) The TI-99/4A machine was introduced at the end of 1979 with a retail price of about $1,000. TI sold a few thousand, but not enough to come close to amortizing the huge research budget invested in it. Competition began to arise in the form of the Atari and Commodore computers. So Texas Instruments put into place a pair of price plummets in 1980: First it reduced the tag to $700, and then to just over $400. The company sold a few thousand more, while the pioneer purchasers became between $300 and $600 worth of angry. By the beginning of 1983, the price had dropped to less than $150, and by the end of the soap opera . . . well, we'll get to that soon.

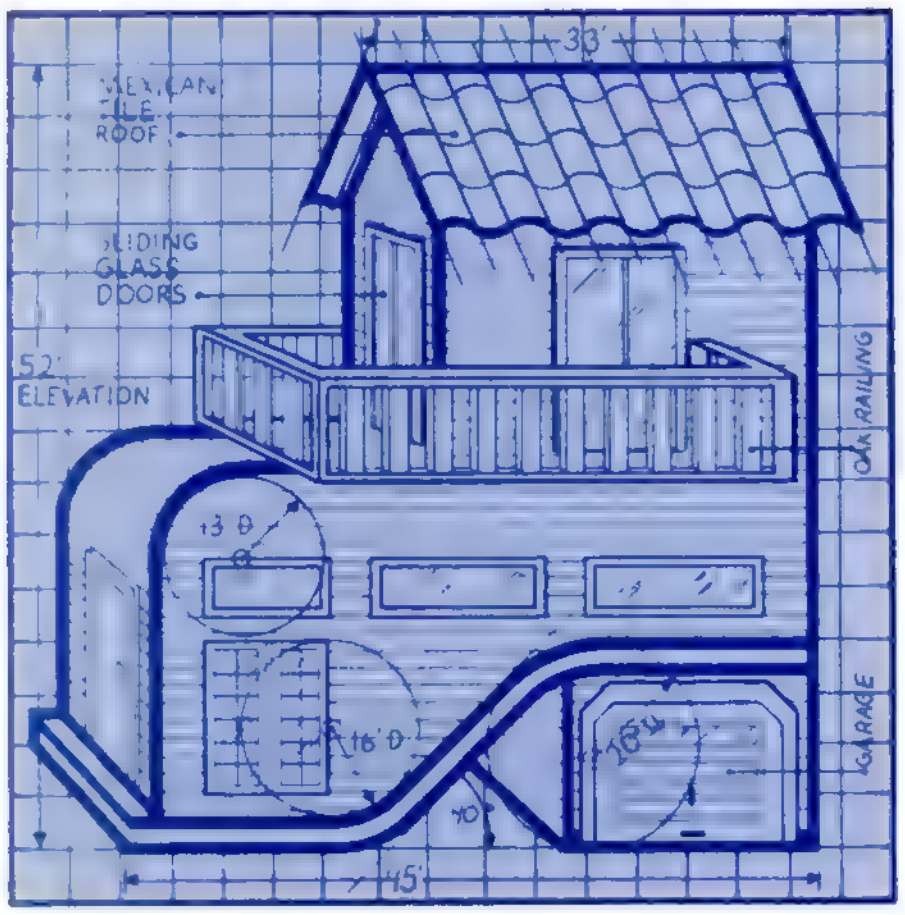
And then, just as the units began to march out of the doors at that price (remember the rebate-mania and Bill Cosby's soft hard sell?), Texas Instruments was hit with the discovery of a potentially hazardous defect in the transformers of thousands of units. Production was shut down immediately, and the machines began flooding back to Texas by the dozen for replacement.

The Peanut Prophecy

Meanwhile, IBM had been selling tens of thousands of its PC and PC-XT models as demand outstripped supply by several months worth of orders. If you went into an IBM Product Center in March, you were told you would have to wait 4 to 6 weeks for a PC. If you ordered a PC-XT, you were given a receipt and a shrug. Ah, but everyone *knew* IBM was going to introduce the Peanut and it would be wonderful.

Next scene: Home computer sales slowed down in the second quarter as the general economy sputtered a bit. Computer companies that had believed they were immune to the real world economy suddenly discovered they were part of the

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SANDLER'S SCREEN

consumer market after all. The street price of the Commodore VIC-20 dropped all the way down to $99, and Texas Instruments was forced to match the price for the TI-99/4A. Then TI began a heavy series of television advertisements for the TI-99/2, even though the unit was not yet in the hands of dealers and a shipment date had yet to be set.

Coleco had a phantasmagorical booth at the show, with flashing lasers and fanfare—but wouldn't let anyone get close enough to touch.

By the time of the spring CES show in Chicago rolled around, the computer world was shaken (well, surprised just a little bit) by the unexpected entry of Coleco into the consumer market with its packaged computer, keyboard, storage, and printer —all with a price tag of less than $700. Coleco had a phantasmagorical booth on the floor of the show, with flashing lasers and fanfare for the uncommon family. The company made fantastic claims about the machine, called the Adam, but wouldn't let anyone get close enough to touch the real thing. The company also promised that hundreds of thousands of units would be on sale by Christmas, and many people in the industry believed it.

Off in another corner of the show, Atari quietly unveiled a line of new "XL" computers it had apparently expected to be the hit of the show, but which had obviously become an also-ran. The company made fantastic claims about its machines and promised hundreds of thousands of units on sale by Christmas, but no one seemed to be interested. *(continued)*

All Quiet on the IBM Front

And IBM? It didn't even have a booth at the show. But everyone just knew that Peanut was out there somewhere and it was even more fantastic, and it was going to be introduced any day.

Oh yes, TI. First one big Texas boot was dropped: The exciting, advertised, but unshipped 99/2 was canceled before its release. Next boot: a $183-million-dollar loss on home computer production.

Third quarter of 1983: Toymaker Mattel decided to stick to its guns and ended production of the critically well-received but slow-selling Aquarius computer.

IBM made no announcements whatsoever, but the entire industry was convinced that the Peanut was just around the corner and it would be truly wonderful, even if no one seemed to know what exactly it was.

Squaring Off at Christmas

Fourth quarter of 1983: The Christmas season was almost upon retail America, but no Coleco Adams had arrived, no Atari XLs were on the stands, and IBM was obviously holding back to blow everyone out of the water with the Peanut, which was bound to be truly wonderful. Whatever it was.

Enter Texas Instruments, clearing its throat. "TI is withdrawing from the home computer marketplace. Goodbye." The company, though, had hundreds of thousands of 99/4As stockpiled in warehouses. So what did it do? It launched an advertising blitz to unload the machines. Every television program and newspaper seemed to be brought to you by Texas Instruments, the company that dropped out of the market.

The machine went for as low as $49, or one-twentieth the street price of the unit when it was introduced. Some wags said the next event would be that people entering computer stores would be handed a TI-99/4A as a door prize. Nevertheless, hundreds of thousands were sold, even though it was obvious that the machine had become an orphan.

Coleco started to dribble out a few units of Adam, and the company immediately was besieged by complaints that the things didn't work. The company's stock dropped precipitously, finally bottoming out on the strength of its unexpected tremendous profits from Cabbage Patch dolls. Cabbage Patch dolls!

Atari shipped a few thousand XLs, but few people noticed.

IBM was obviously holding back to blow everyone out of the water with the Peanut, which was bound to be truly wonderful. Whatever it was.

The PC What?

And IBM, in a surprise move, announced the Peanut on November 1. Only it was not called the Peanut; it was called the PC*jr*, and it was apparently not the same machine described by all of those people who absolutely swore they knew what IBM was up to. But it was wonderful anyhow. Hundreds of thousands will sell, everyone agreed, even at a price higher than many expected.

Only it was not available, because Big Blue, in its great wisdom, had decided to market the machine sometime in the first quarter of 1984, skipping the 1983 Christmas selling orgy completely.

Poor Coleco. Poor Atari. All that demand and they didn't get their machines to market. So, what did they do? Why, they raised their prices, of course. How else do you compete?

Now really, would I—could I—make all this up? Microcomputerdom in 1983 was but a parade of the walking wounded. I've come up with the real title for this soap opera: "General Hospital." ■



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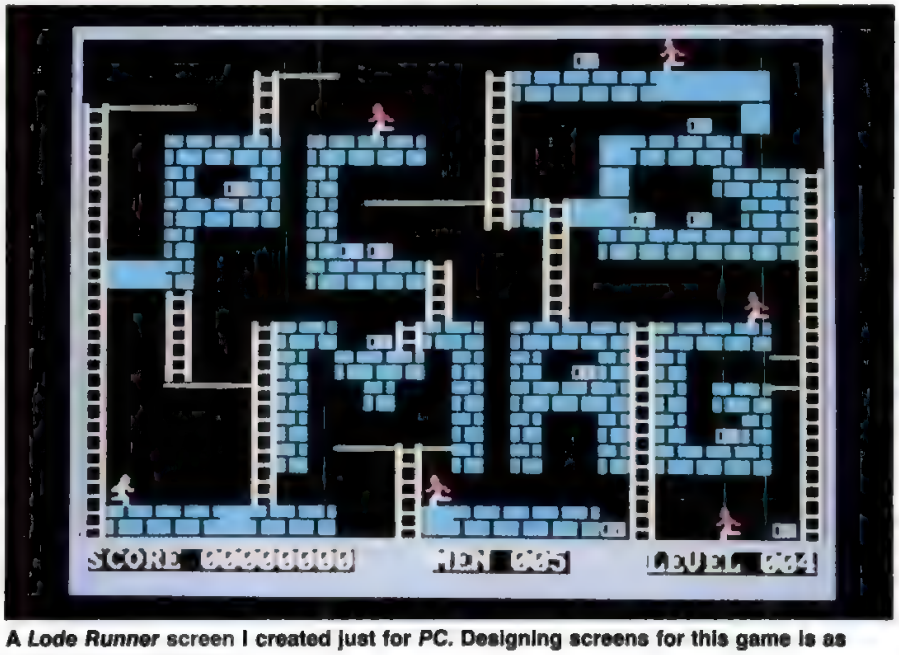
Lode Runner features fast action, terrific graphics, and it even challenges you to create your own screens. It's a real winner, especially in contrast to the tasteless, undercooked BurgerTime.

Lode Runner is a tour de force of American ingenuity. It is the first release in a long, long time that can honestly bear the title, "computer game." The game is fun; it demands quick reflexes and it offers bright colors and catchy tunes. But, most importantly, *Lode Runner* uses the power of your PC to create something much more than a video version of Ping Pong. This game requires thought, too.

There are 150 different mazes on the disk, each with new and unusual challenges. As impressive as this is, *Lode Runner* has an even greater bonus: It includes a game editor. You can create your own mazes and fine-tune them again and again. You can change the speed of play and adjust the number of turns. You can rig it to a child's level, or you can create a maze that even your snotty 12-year-old next-door neighbor would get lost in.

Lode Runner
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Requires: 64K RAM, one disk drive, color/graphics adapter, game adapter and joystick optional.

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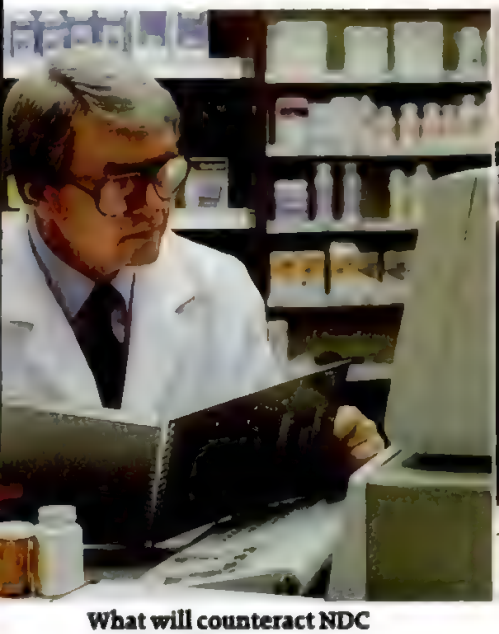
A *Lode Runner* screen I created just for *PC*. Designing screens for this game is as much fun as playing it.

Broderbund, a powerhouse in the tough Apple II game market, is just now venturing onto the IBM PC shelves. The PC version of this popular game is obviously related to recent arcade and personal computer favorites such as *Donkey Kong*, *Apple Panic*, and *Big Top*. As the Lode Runner, you dart up and down ladders, across hand-over-hand bars, through trapdoors, and, when necessary, down through holes you've blasted through the floor. Your goal is to pick up the chests of gold scattered about, while avoiding the "deadly Bungeling guards" who are hotly pursuing you. You can dig holes and trap the guards and then scamper across their heads, or you can drop from level to level to avoid their clutches. Although the *Lode Runner* packaging suggests otherwise, you can't shoot the guards—a plus in my book.

When the game begins you are present-

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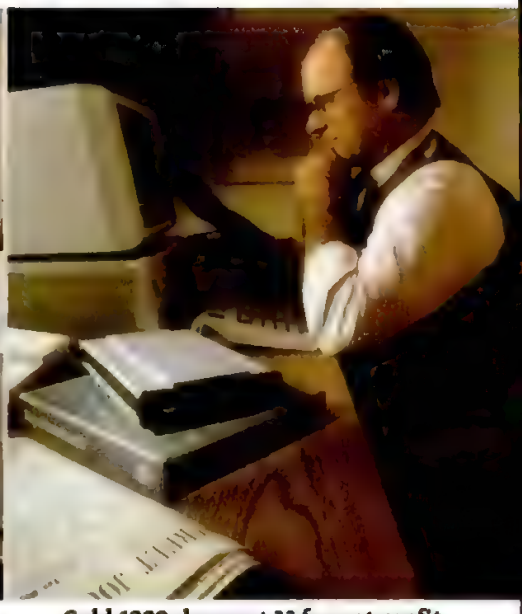
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ed with a sharp, colorful maze of bricks, ladders, and hand-over-hand crawl bars. The image on an RGB color monitor is among the best I've seen. (The game can also be played on a monochrome monitor connected to the color/graphics adapter, but you may lose track of the good guy in the field of bad guys.) Play is quick and responsive using the joystick; it is quick and difficult using the numeric keypad on the keyboard.

Level Headed

To complete a level, you must scurry about, up and down, left and right, to collect all of the gold chests. You can use your "laser drill pistol" to cut holes through the brick floors, either as an escape route for yourself or as a trap for one of your pursuers. Some of the guards will pick up and carry the golden chests with them; when this happens, you'll have to trap the guard and steal the chest before he wriggles out of the hole. When all of the chests have been retrieved, a new ladder will appear at the top of the screen. You've got to climb out of harm's way—and into a new screen of trouble.

You can also cheat—or practice—by assigning yourself more than the usual six lives per game.

The game includes an adjustment sequence for joysticks, the ability to start at any level from 1 to 150, and a demonstration mode. You can also cheat—or practice—by assigning yourself more than the usual six lives per game. However, high scores racked up in this manner are not recorded in the on-disk scoreboard.

What brings *Lode Runner* into the pantheon of classic arcade games is its progressive nature. Every player can find his own level, and as the player improves, the game becomes more and more challenging. I sneaked a peek at levels 145 through 150 and retreated in terror— but the first time I played the game I found levels 2 through 4 impossible, and now I breeze right past them into my present niche—around screen 18.

Do-it-yourself Design

But what makes *Lode Runner* truly great is its do-it-yourself game design element. After you've initialized a blank diskette using the program's own operating system, you can use the game editor to create your own screens. It's not easy, though, to make a workable—and completable—screen. I kept coming up with dead ends and missions impossible, but after a while I was able to refine the screen I created to make it playable, which gave me a real feeling of accomplishment. This game design element should appeal to both children and grown-up children alike.

Not only is *Lode Runner* a whole lot of fun; it also challenges the mind and creativity of the user by providing a glimpse into the artistry of creating a computer arcade game.

I am constitutionally opposed to awarding a perfect score to anyone or anything, but *Lode Runner* comes very close. It could use a few touch-ups on sound effects and perhaps more representative packaging. On *PC Magazine*'s game rating scale, *Lode Runner* runs off with a lot of gold. Out of a possible 18 it scores:

FUN:	5.5
CHALLENGE:	5.75
GRAPHICS/SOUND:	5
TOTAL:	16.25

BurgerTime
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Now, I ask you: who but Ronald McDonald would believe a game based on a story line like that?

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A typical *BurgerTime* screen. This game is palatable only to those who prefer hot dogs to haute cuisine.

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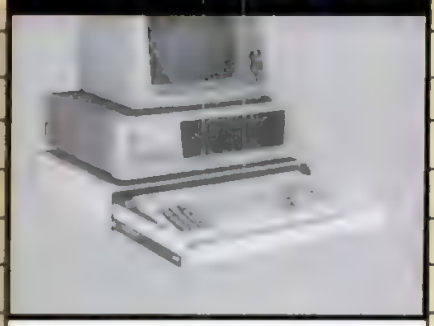
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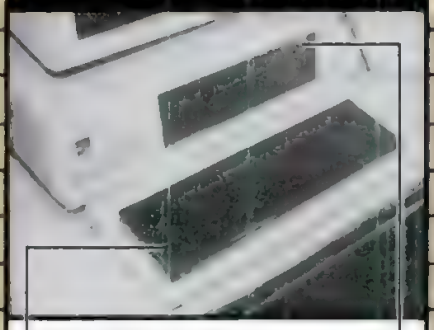
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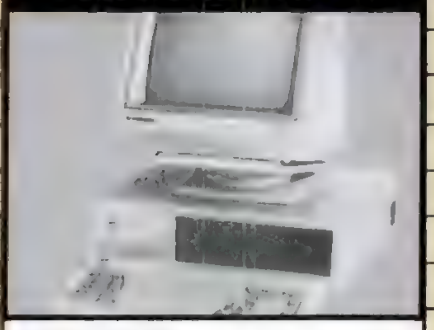
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PC ARCADE

ing a cloud of pepper in the attackers' direction. Ice cream cones, cups of coffee, or paper sacks of soggy french fries provide sustenance and points.

Not Very Tasty

That's the idea behind this whopper, but the graphics are about as attractive as an uncooked Burger King fish filet, the sound effects have all the charm of an Arby's cash register, and it's nearly as intellectually stimulating as a conversation with Ronald McDonald. The game is painfully slow in the lower reaches, and the programming for the attacking "nasties" is very predictable—the attackers always appear in the same starting places and always follow the same opening moves.

Comparing this ladder-and-chute game with *Lode Runner* should be grounds for permanent assignment to midnight scullery duty at Wendy's. There are really only two reasons why this game appears here at all: One is that it is an early offering for the PC from the toy giant Mattel, and the second is that Mattel has been salting the television airwaves with commercials for the various versions of this game.

Child's Play?

It's possible the game was designed for children, which might help explain the primitive graphics and slow speed. So, lest someone accuse me of applying my adult bias to a child's game, I showed it to next-door neighbor Alyson, age 3. Her review: "This is silly."

McDonalds upsets my stomach; *BurgerTime* upsets my mind. I humbly suggest that this game would appeal only to tastes that prefer the sizzle to the steak and the commercial to the real thing.

On *PC Magazine*'s scale from one to six, *BurgerTime* deserves a flame broiling. It scores:

FUN:	2
CHALLENGE:	2
GRAPHICS/SOUND:	2
TOTAL:	6

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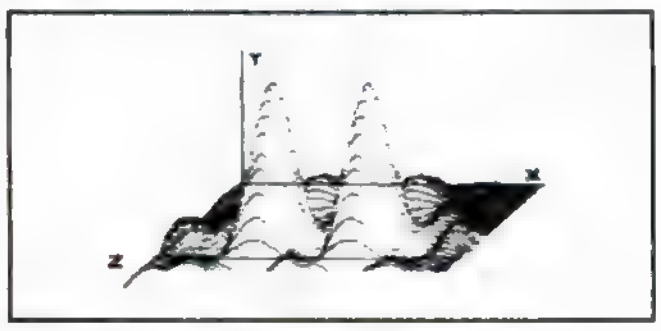
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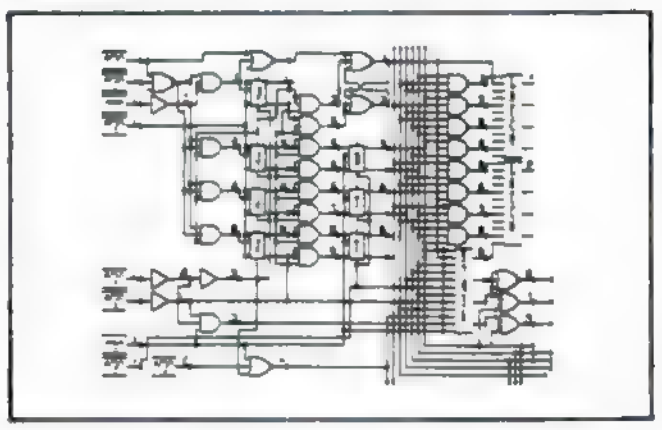
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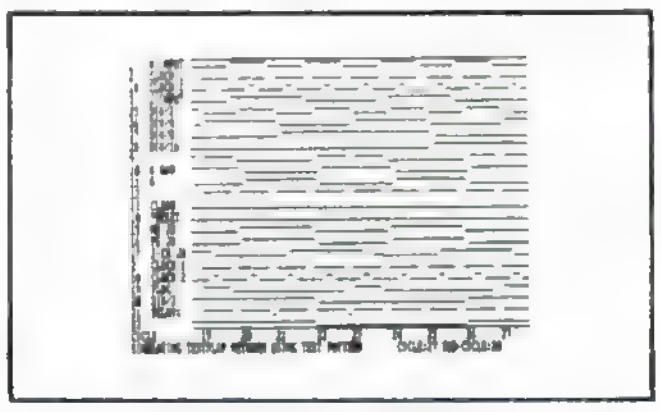
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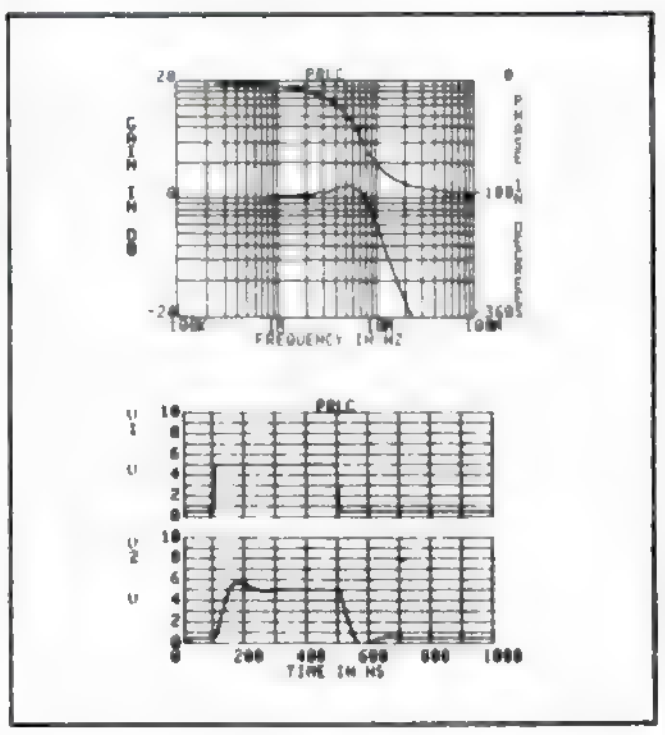
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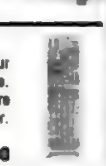
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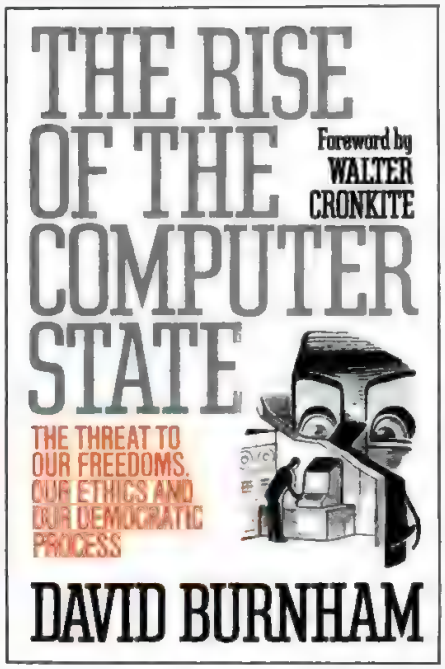
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The Cream of the Crop

The microcomputer revolution has spawned a microcomputer book backlash. Literally thousands of computer books were published last year. Here are five that are worthy of your time.

Walk into any computer store, and you'll see that the only things multiplying faster than the computers themselves are the new books capitalizing on them. Computer books are spewing forth from every commercial, technical, and homebrew publisher under the sun. The information age has arrived with a vengeance. It's telling you how to program in BASIC, Pascal, and 20 other languages and how to buy your first, next, child's, and small-business computer. There are books to teach *1-2-3*, *dBASE II*, CP/M, MS-DOS, *WordStar*, and other popular software; there are books about the IBM PC, PC*jr*, Apple IIe, Macintosh, and Timex/Sinclair 1000. There are those that teach you how to write your own games, graphics, and music. And then there are those that claim to help you write your own ticket into the future.

The only question left unanswered is how to differentiate among the masses. According to Katharine Davis Fishman, "There is no significant issue pertaining to computer technology that cannot be described clearly in plain English and understood by real-estate brokers, sculptors, and teachers of nineteenth-century French literature." And if you take her word, you'll discover that most of the 2,000 books on computers that appeared last year fail this test badly. They're generally stuffy, hare-brained, incomplete, or condescending. Those that transcend simple-mindedness are often absolutely mystifying.



The Rise of the Computer State
David Burnham
(Random House, New York, 1983)
275 pages; hardcover; $17.95
ISBN 0-394-51437-8

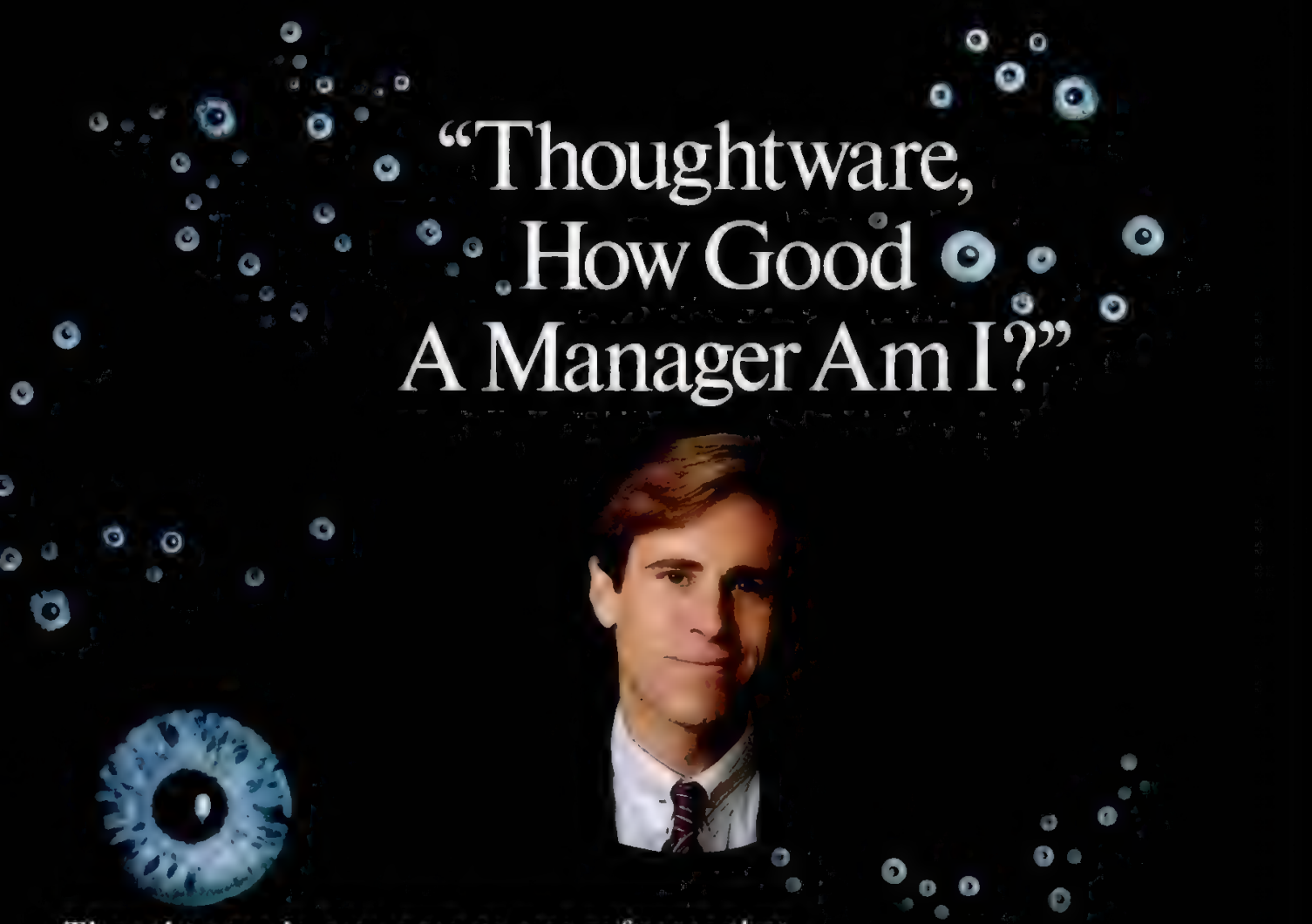
CIRCLE 682 ON READER SERVICE CARD

Of course, that's not always the case. Whatever flaws the following books may have, they are, generally speaking, the literate cream of a poor crop.

The most disturbing book I've read in the last year, and one whose conclusions have provoked considerable debate, is *The Rise of the Computer State* by the *New York Times* reporter David Burnham. Burnham's thesis is that individual liberty and privacy in the United States have long benefited from the inefficiency of bureaucracies and that the extraordinary capabilities of the computer make unprecedented incursions on our liberties, in the name of national security and crime deterrence, both possible and likely.

For example, in Los Angeles, 30 separate law-enforcement agencies have banded together to form a unified computerized warrant system. The system's faults in conception and operation have resulted in tens of thousands of wholly innocent people being detained by the police in the last decade. Burnham cites chapter and verse of illegal governmental spying on hundreds of thousands of citizens not even suspected of breaking the law. Other intrusions include listening in on millions of phone calls to South America to gather evidence on drug deals and examination by the National Security Agency of almost every foreign-bound cable sent over a period of 30 years. Burnham points out that legitimate steps taken to control a few criminals or security risks have expanded into secret surveillance of innocent citi-

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BOOK REVIEW

zens pursuing legitimate activities.

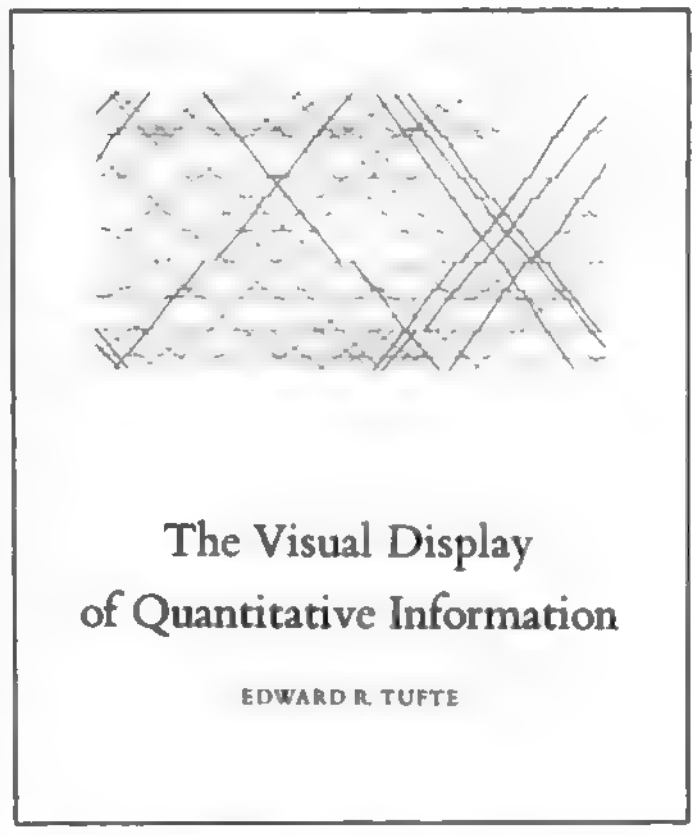
As we become a "wired" society, more and more of our activities are monitored and recorded. Examples range from what we buy and how much we spend to how quickly we pay our bills—whether we prefer watching the President's State-of-the-Union address or a blue movie. In other words, as Charles Ferris, then the chairman of the Federal Communications Commission, put it in a speech in 1981, the computers managing the recordkeeping "will know more about us than anyone should." The development of these extensive transactional histories is worrisome because, as Burnham repeatedly reminds us, "it is hard to deny technology." Once individuals, companies, or governments have the technical ability to travel down a specific path, they probably will. Furthermore, history tells us that a legal prohibition is often an insufficient brake. Thus, our losses from computers may outweigh our gains.

The Visual Display of Quantitative Information
Edward R. Tufte
(Graphics Press, Cheshire, CT, 1983)
199 pages; hardcover; $34

CIRCLE 683 ON READER SERVICE CARD

Occasionally, certain books serve to reorient and refresh; they help the reader keep the main, basic lessons of their chosen subject firmly in mind. This is not an easy task for a book to accomplish: It must clear the cobwebs from your mind, present concise opinions and examples, mix provocative argument with the sweet sense of reason, and provide graceful reference to history.

Edward Tufte's *Visual Display of Quantitative Information* is one such book. It's a touchstone of style, and in fact he acknowledges that Strunk and White's exemplary *Elements of Style* was an inspiration. Both books declare the belief: "Clarity in design and complexity in information are what count"—a measure of quality that could be aptly applied to many fields.



Tufte's subject matter is what he calls "data graphics"—charts, graphs, maps, which present information via words, numbers, and pictures simultaneously. He propogates many straightforward rules and deplores countless foolish practices. As readers, we are exhorted to prune, ruthlessly and vigorously, any boundaries, scales, or tick marks that fail to present fresh information. Tufte believes that a reader should not have to rely too heavily on charts; for 20 numbers or less, he declares, tables usually outperform data graphics.

The advice is practical and speaks to the real problems of proper conception: Don't obscure the data by its presentation. Revise and edit a graph the same way you would work on a piece of prose. And, if the statistics are boring, then you've got the wrong numbers. Finding the right numbers requires as much skill and hard work as creating a beautiful design or covering a complex news story. Tufte's stern tone is not so much that of a drill sergeant as of a balletmaster. Discipline, precision, attention to basics, and some old-fashioned hard work are essential to a clear presentation. It should only *appear* effortless.

Given the proliferation of graphics programs and of integrated programs that offer that capability, this book has arrived none too soon. Other books and manuals

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BOOK REVIEW

may tell you how to operate graphics programs and how to steer the data; *The Visual Display of Quantitative Information* points you in the right direction before you start.

Incorporation of computers into the very act of creation predicts a shift in how society perceives the new machines.

Genesis II: Creation and Recreation With Computers
Dale Peterson
(Reston Publishing Co., Reston, VA, 1983)
205 pages; softcover; $18.95
ISBN 0-8359-2433-5

CIRCLE 684 ON READER SERVICE CARD

Genesis II is an ambitious work scaled down by reality, and it's all the better for it. Intending originally to cover all the creative uses of computers, Dale Peterson eventually restricted himself to an examination of the computer's use in four fields: the visual arts, music, writing, and what could be labeled games (including such interactive modeling as MIT professor Jay Forrester's work on mathematical simulations of the world).

Peterson starts with an explanation of the development of the technology. He discusses a number of North American artists who have used computers to achieve previously unobtainable effects. These effects range from greater precision in drawing and creation of new sounds to interactive and collaborative creation in the performing arts and in writing fiction.

The artist's ingenuous incorporation of computers into the very act of creation per-

haps predicts a shift in how society perceives the new machines. Or it may be no more than one step in what Sir James Jeans called our "emancipation from the purely human angle of vision."

Previews and Premises
Alvin Toffler
(William Morrow & Co., New York, 1983)
230 pages; hardcover; $11.95
ISBN 0-688-0910-2

CIRCLE 685 ON READER SERVICE CARD

The present day has few thinkers-observers-reporters as iconoclastic as Alvin Toffler. His book *Future Shock* shook the Western world wide awake, redefining the way we look at change. In *The Third Wave*, he discussed the breakdown of the economic and social systems born in the industrial era and pointed to the development of a new economic order, in which antidehumanization and decentralization would be a natural by-product of the irreversible spread of computer power. In *Previews and Premises*, Toffler expands on the ideas he presented in *The Third Wave*. An interviewer prods him to tie up loose ends, especially those pertaining to political matters. He is particularly perceptive about Japanese and European attitudes toward the work place. Toffler has novel ideas about the economic consequences of information and about the replacement of the factory worker with the "mind worker."

The Computer Phone Book
Mike Cane
(Plume, New York, 1983)
451 pages; softcover; $9.95
ISBN 0-452-25446-9

CIRCLE 686 ON READER SERVICE CARD

The Computer Phone Book is a directory—apparently exhaustive, though I can't vouch for that—of the more than 400 national, regional, and local bulletin-board systems you can access with a simple phone call. The vagaries of each system are nicely detailed, and the national networks receive particular attention. Since I believe that BRS and Dow Jones News/Retrieval Service will prove more useful than The Source or CompuServe, I was pleased that they received sufficient coverage. A word of warning: Computer bulletin boards can be addictive. ■

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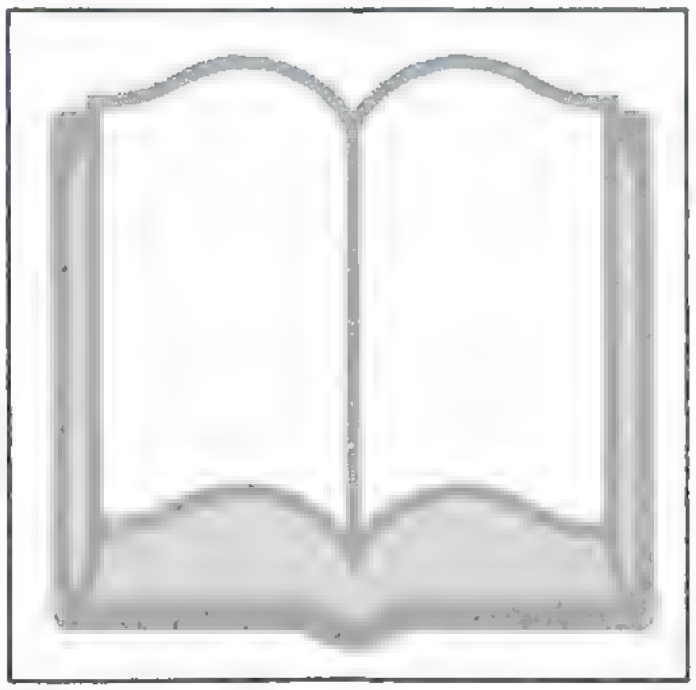
A card file program is the electronic equivalent of a packet of 3-by-5 cards, with added features for selecting key words and indexing. Here's how some of these programs stack up.

Finding easy ways to store and retrieve your notes may not make you a Nobel-winning stylist, but it can help enormously with the everyday business and craft of writing. If you look at your PC as a tool kit to let you write more easily and more productively, one tool to consider is a card file database.

This type of program allows you to work with your computer as if it were the electronic equivalent of a packet of familiar 3-by-5 index cards. They can be used for name and address files, indexes, bibliographies, product descriptions, and any other small records. You can learn to use the simplest of these programs in minutes and within a day you can expect to become quite competent.

The primary disadvantage of card file programs results from their list-oriented heritage. Editing features are usually less sophisticated than those on word processing programs. On some computer card files, you can only store a few dozen lines of information in each entry, and several hold no more than what could actually fit on a 3-by-5 card. Formatting options for reports you can create from the file are usually limited. And you don't have the full searching, sorting, and arithmetic features you might find on a more complex database.

The principal feature that characterizes a card file program is the storage and



retrieval of short text records according to an index of key words. You specify the key words that each text record should be indexed under, and the card file program maintains a list of key word terms and of the records that are categorized under each term. To retrieve information, you just ask for all the entries that you indexed under a particular topic.

Keeping Flexible

The effect is almost as if you had established a duplicate card deck for each index term. As you add an entry and note its index terms, the entry is duplicated and added to all the right decks. You can review any deck at any time and add or delete entries. If you correct or change an entry, all the decks are automatically updated.

With most card file programs you can make copies of your data, reclassify it easily, and print out reports in many different orders to see what the result may look like. And once you get the data in the order you want it, most card file programs let you output the data to a word processor for reworking.

These programs also let you select records based on combinations of criteria. You can specify that records selected must contain all the named key words (the And function), any of the key words (Or), or some combination.

Card file programs for the PC cover a wide range of features, so you should take a good look at your needs before picking out a particular brand. The four programs discussed below illustrate some of the factors worth considering (see next page for product information).

Ease of Use

If you need to get going on a project right away, ease of use should be one of the most important criteria in your selection. You can probably start using *PC File* within 10 minutes of opening the package (12 if you count the 2 minutes it takes to back up the disk). This program only comes with 10 pages of instructions, and you may not have to read more than one or two to get started.

TMP/Free Form comes with more

than 2 dozen pages about the *Free Form* package; it also includes an audiotape that repeats the example in the manual.

Cardbox has a slim tutorial and introductory manual to get you going right away, and a 70-page reference manual with more detailed information.

DataFax provides the most extensive documentation—an exhaustive 230 pages. But, as it says clearly on the first page, "You do not have to read this entire manual to use *DataFax*!"

Of course, ease of use tends to be inversely related to power and flexibility, but this is not absolutely so. *PC File* won't do everything the more complex programs will do, but if your filing needs are modest and you need the time to write, you might want to make that trade-off.

Importing and Exporting

If writing is your main application, another crucial factor is how easily you can get text into and out of your card file. Along with keying the text directly into the program, it's nice to be able to have the card file read an existing text file. It's essential for it to be able to write out your results in disk file form. Database users call these two functions "importing" and "exporting."

PC File both imports and exports. However, you can only import text formatted as individual files small enough to fit in a single card entry (up to 200 lines of not more than 65 characters), and you have to specify each import operation separately. *Free Form* doesn't import at all, though it does export.

Cardbox will import in one of several formats, including one that is easy to create with most text editors. You do have to structure your information exactly as *Cardbox* expects, but you can load an entire card file in one operation. *DataFax* can import in a similar fashion, but it runs under the UCSD p-System, so you can only import and export files from p-System disks.

All four programs are much better at exporting than importing. Once you've entered your records, any of these programs will let you write a text file containing all the records categorized under a selected key word.

Specifying key words that entries are filed under also varies significantly between programs. If categorization is not one of your strong points, you might want to pay particular attention to programs that help out in this area.

PC File provides the least help with key words. You're supposed to enter key words before you type in the text of each entry. In practice, unless you've written your material out on paper beforehand, you'll probably want to enter the text first and then the key words. I do that on *PC File* by editing each entry after I've entered the text.

In *Free Form*, you don't have to type the key words separately. As you enter or edit your text, you can select any term and mark it as a key word. The program displays a cumulative list of marked words for each entry as you make your selections. *DataFax* also allows you to add key words by selecting existing terms in your text.

Cardbox provides the most flexible key word system of all. You can choose Manual mode, in which you list each word you want used as a key; All mode, which will index every word in the entry; or Auto mode, which indexes every word except the ones you ask it to omit.

If you're fairly organized, even *PC File*'s manual entry of key words will do fine. But if you don't know what you'll be looking for or how you want to sort everything out, you'll do best with *Cardbox*.

Entering and Editing

PC File doesn't pretend to include sophisticated text editing functions. In either the text creation or edit mode, you can only move back and forward by line, and when making any change you must retype the entire line. *Free Form* adds an onscreen editing menu, word wrap, and the ability to move lines around in a file by saving them in a temporary hold buffer.

DataFax and *Cardbox* both feature screen-oriented editors. You can move left, right, up, and down, and delete and add individual characters.

If you're going to be doing a lot of updating and correcting, you'll probably want the more sophisticated editing functions. But if you're basically entering your paper notes to shuffle them ten different ways, you can get by with simpler facilities. ■

Cardbox
Micro Technical Products, Inc.
888 7th Ave., Suite 4500
New York, NY 10106
List Price: $245
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CIRCLE 730 ON READER SERVICE CARD

DataFax
Link Systems
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Santa Monica, CA 90401
(213) 453-3921
List Price: $299
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CIRCLE 731 ON READER SERVICE CARD

PC File
TexaSoft, Inc.
660 One Energy Sq.
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Dallas, TX 75206
(214) 369-0795
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CIRCLE 732 ON READER SERVICE CARD

TMP/Free Form
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Acronyms for Education

Educational software programs are usually classified according to specific instructional techniques such as CAI, CAL, and CMI. What do these acronyms stand for?

The rough partnership between education and computing serves the needs of both traditional students, who are taught in conventional settings, and of adults, whose learning requirements are often job related and task specific. Both groups are using the computer as an educational tool, and, as a result, the market abounds with educational software (often called courseware). These programs promise to make learning easier, faster, cheaper, and more productive.

Are these claims fact or flak? Before you can decide, you need to know the basics—what is educational software? The available programs fall into a number of distinct categories.

Any field claiming at least an ounce of silicon in its predigree has its share of acronyms, and educational computing is no exception. The acronyms CBE, CBT, CAI, and CMI constitute the basic vocabulary for educational software.

Computer-based education (CBE) and computer-based training (CBT) are general terms that describe the use of a computer as an educational tool. The computing techniques used in CBE and CBT are basically the same; they differ only in mix and emphasis. The significant distinction is actually between *education* and *training*. Education's goal is to produce well-rounded and knowledgeable students. By contrast, training has a precise and limited



goal: acquiring a specific skill. Education is a life-long process; training, a short-term activity. With this distinction in mind, let's turn to some of the instructional techniques used in CBE and CBT.

Computer-Assisted Instruction

Sometimes computer-assisted instruction (CAI) is viewed as a single educational application. In fact, CAI includes various educational strategies, most notably drill-and-practice and tutorials.

Drill and practice is well suited for mastering facts and relationships that require quick, uncritical recognition. On or off the computer, it can be used to teach the multiplication tables, chemical formulas, or the silhouettes of enemy aircraft. But despite the connotation of military maneuvers, drill and practice is actually a benign exercise consisting of the brief presentation of a series of short questions. At the heart of this venerable technique is repetition. Have you ever used flashcards to build your vocabulary in a foreign language? Drill and practice in manual mode. Computer-based drill and practice, however, has an edge: A drill question can be altered with randomly generated numeric values or randomly selected words. This is akin to shuffling the deck while replacing cards with every pass.

A computer can also carry out the automated equivalent of sorting the cards into piles of learned and unlearned items. Moreover, a drill-and-practice program can add new items of equal or increasing difficulty to the unlearned stack.

Tutorials are straightforward and expository; they present facts, concepts, and perhaps, a point of view, and they do so interactively. In printed text, what you see is what you get. In an interactive text, what you see changes according to your needs, wants and understanding. A mixed-initiative tutorial permits either the machine or the user to take the lead.

At appropriate points, CAI tutorials can be punctuated with items that give the user the opportunity for self assessment. Well-designed interactive tutorials use the results of these short quizzes in subtle, constructive ways. For instance, upon missing an item, a learner might be given

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EDUCATION

the option to review previous sections or to request a remedial tutorial. This nonevaluative tactic provides support and additional instruction for learners who may have initially selected, or been assigned to, material beyond their ability.

A more complex tutorial might vary the text along several dimensions (that is, reading level and conceptual density) as learner and computer interact. For example, imagine a "text reservoir" of reading selections that cover identical subject matter at different levels of difficulty. A learner starts by selecting the initial subject and level of difficulty. Periodically the computer presents a question that the learner answers, and the text display that follows is matched to the level of understanding (or misunderstanding) revealed by the learner's response.

Computer-Assisted Learning

What's the difference between CAI and CAL? Here's an analogy that will help to explain: Suppose you ask two close friends for help. Your first friend, after hearing your problem, tells you about a similar problem he had, how he solved it, and what he thinks you ought to do. Your second friend listens to you explain your problem; he talks very little except to rephrase your statements, clarify your meaning, and to extract more information about your situation. In short, the first friend tells you how to solve your problem, while the second *guides you* to a solution while monitoring your problem solving through feedback and probing.

Your first friend's directive technique is analogous to CAI: The learner approaches the computer with a well-defined educational need. CAI courseware responds by presenting relevant material and evaluating the learner's performance. There is little ambiguity as to the goals and criteria for good performance. The nondirective technique of your second friend is analogous to CAL: The computer facilitates learning by providing an environment for learner experimentation. In some instances, the environ-

ment may correspond to the real world and demand specific performance. At other times, success is not tied to precise performance, nor is it measurable.

Another powerful CAL technique is simulation. The computer can simulate the functions of any other device if given the appropriate instructions. It can imitate virtually anything in the physical world.

Simulation is a preferred training tech-

Computer-based simulation can help with the realities of limited educational resources.

nique where expense or danger prohibits the use of the actual equipment. For instance, flight simulators are used by astronauts and airline pilots while process simulators train operators of power plants and petroleum refineries.

Computer-based simulation can help cope with the realities of limited educational resources, either physical or financial. In a chemistry lab, for instance, the supervision of students handling dangerous chemicals can be reduced through electronic experimentation.

Computer-Managed Instruction

Another category that educational software might fall into is computer-managed instruction (CMI). This technique is used not to instruct but rather to guide instruction. A CMI system is similar to an operating system in that both orchestrate and manage human interaction with computational resources. CMI packages are integrated software systems that enable a user (the test creator) to construct tests and track the performance of a learner (the test taker). They also assist the learner through the testing and learning experience.

When the typical learner accesses a CMI system and identifies himself, the system locates the learner's record or cre-

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ates one if this is the first encounter. After some initial orientation, the learner has the option of taking a pretest, viewing a list of study materials or taking a test after study has been completed.

Tests can consist of a fixed or variable number of multiple-choice, matching, true-false, or short-answer items. Those items that the learner sees on the screen can be linked to performance during testing. This technique of *adaptive testing* varies the number and difficulty of test items in accordance with the learner's correct and incorrect responses. The test is truncated or lengthened as the learner demonstrates his knowledge or ignorance.

The CMI system is valuable for users who must construct tests and specify rules for learner interaction. Test questions are built with item editors, simple word processors that can also support the creation and insertion of simple graphics in the question text.

Since tests are often retaken, some provision for alternate test items is not only desirable but necessary. There are at least two ways CMI systems meet this requirement. Some allow item pools from which alternate forms of a question can be selected; others generate random (but appropriate) numerical values to replace variables in the question text.

The user can also customize testing strategies and options governing test duration, item presentation (random or sequential), testing prerequisites, test termination, and test mastery criteria.

Any system even partially resembling a generic CMI system requires significant computational overhead and mass storage capacity. For this reason, many powerful full-featured CMI systems run, at present, on mainframes, not micros.

In a future issue of *PC*, I will round out this overview with an examination of courseware development. ■

Harold Goldes is a consultant for the Organization Analysis and Research Group at Merrill Lynch & Company in New York City.

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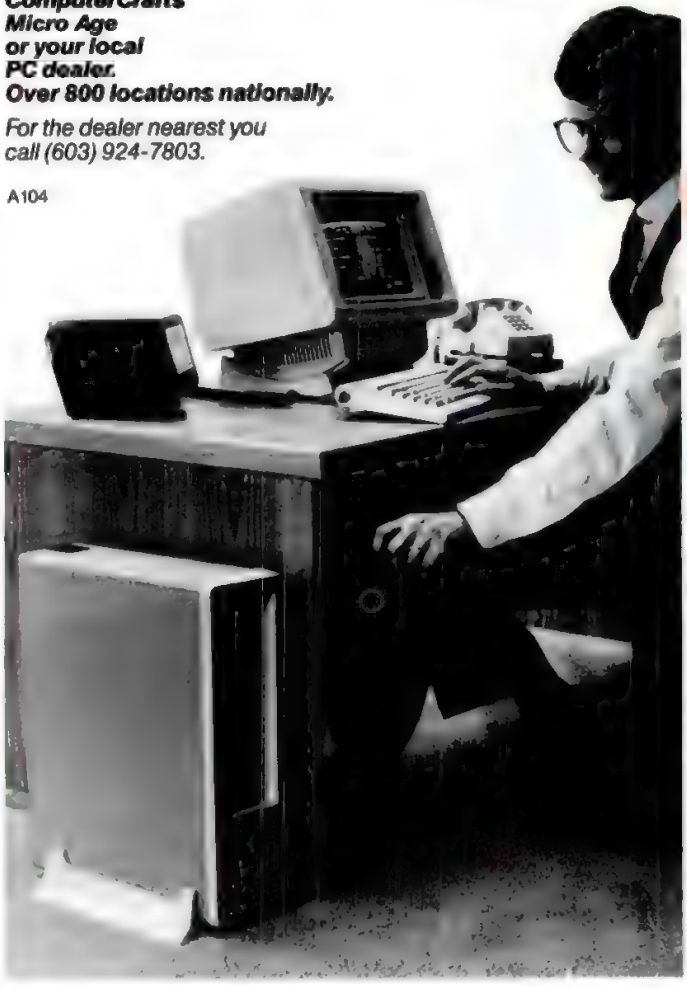
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If you bought a computer last year for your business, you can take a generous tax deduction. But look before you file—the early deduction may not be the best approach for you.

It isn't often that the Internal Revenue Service dispenses good cheer at tax time, but if you bought a computer in 1983, you may be in for a pleasant surprise on April 15th: an extra $5,000 deduction. Whence cometh this manna, and who can eat of it?

The bonanza arrived as part of the Economic Recovery Tax Act of 1981. Section 179 of the tax code was changed to allow an expense deduction of up to $5,000 a year for the cost of "tangible personal property" during the first year in which you put it to use in your business. It's available as an alternative to the usual approach, which involves treating such business equipment as a capital asset and depreciating it over a number of years.

The new expense deduction is available to any corporation, partnership, or individual buying a computer to use for what the Internal Revenue Service calls "carrying on a trade or business." What is a trade or business? Essentially it means selling goods or services to make a profit. This obviously includes IBM, the local real eastate dealer, the neighborhood word processing business, a doctor, a freelance journalist, and even a professor in pursuit of tenure laboring at home on research for a learned article. A trade or business doesn't include the investor managing his own portfolio or the hobbyist who hopes that someday the proceeds from her avocation will help defray the costs and perhaps eventually show a profit.

The IRS does not consider that the investor is engaged in a trade or business, but does allow him to deduct the expenses of holding the securities, buying investment advisory services, and managing his money under a different provision. Section 212 of the tax law covers expenses incurred "for the production of income."

The difference is that if you are in a trade or business and you installed a $5,000 computer system in 1983, Section 179 lets you deduct the entire cost just as if it were a current expense. You elect to do this on Form 4562, which you attach to Schedule C, *Profit (or Loss) from a Trade or Business*. The net result winds up at line 12 of your individual Form 1040, whether or not you itemize other deductions. By electing to take the $5,000 cost recovery deduction as an expense in the first year, you also elect to sacrifice the 10 percent investment tax credit on this asset and any depreciation of the $5,000 cost.

On the other hand, you may have acquired your $5,000 computer system to track your commodity trades and keep records of the changing market values of your stocks and bonds. Section 212 allows you to deduct the depreciation on the computer as an expense, because the computer is a piece of equipment used in the production of income.

A computer is classed as property to be

Item	Businessperson	Investor
Taxable income except for computer	$40,000	$40,000
Section 179 deduction	(5,000)	
ACRS depreciation		(712.50)
Net taxable income	35,000	39,287.50
Approximate tax 35% marginal rate	6,500	8,000
Investment tax credit		(500)
Net tax liability	6,500	7,500

Figure 1: *This comparison chart can help you decide if you should take the Section 179 deduction or if you're better off with a tax credit and depreciation allowance.*

depreciated over a 5-year period under the Accelerated Cost Recovery System (ACRS) rules. The first year's depreciation is 15 percent or $750. The ACRS depreciation deduction in the second year is 22 percent ($1,100) and 21 percent ($1,050) for each of the next 3 years. For an individual, the depreciation deduction goes on Schedule A, *Itemized Deductions*, at line 24 and the IRS will want a Form 4562 to back it up. In addition to the $750 deduction, if you use the computer for the production of income, you are entitled to a 10 percent investment tax credit of $500 in the first year. This $500 credit is worth more than a deduction since it is not subtracted from income but directly from the tax you otherwise owe. As a condition of using the investment credit, you either must reduce your depreciable basis in the computer by one half of the 10 percent credit to $4,750 or take only an 8 percent investment credit of $400. Figure 1 compares the 1983 treatment for a businessperson and an investor.

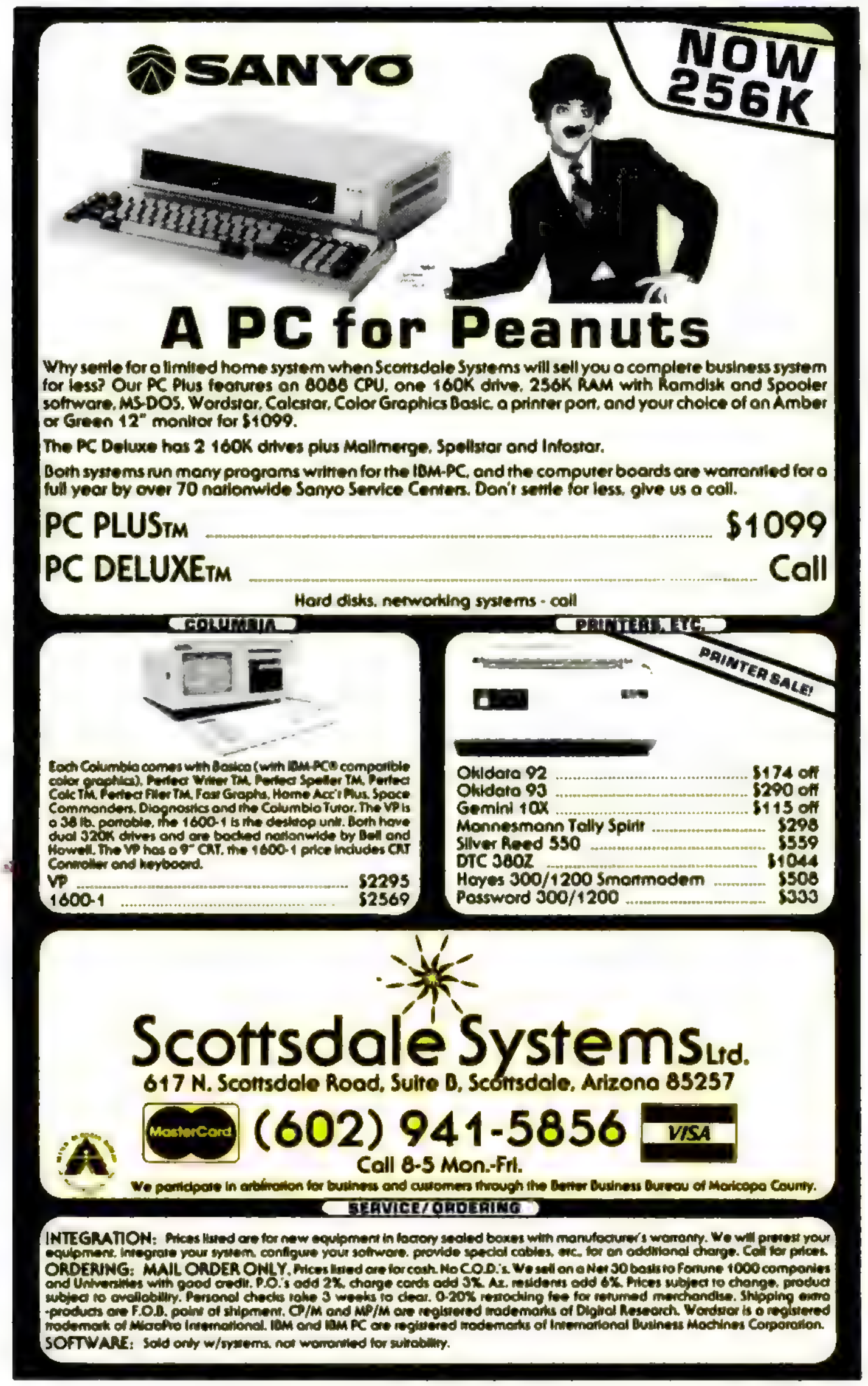
The investor will still have $4,037.50 of undepreciated cost basis in his computer, for which he will be allowed a deduction in each of the next 4 years. He may deduct $1,045 in 1984 and $997.50 in 1985, 1986, and 1987, saving another $1,413.13 in federal tax, assuming the 35 percent rate continues to apply. The businessperson used up his whole deduction in 1983.

At first glance, it looks as if the investor comes out ahead since his depreciation ultimately comes within $250 of the Section 179 deduction and he gets a $500 investment tax credit to boot.

Is he ahead? The answer depends on several factors. One factor is the taxpayer's tax bracket for each of the years involved and another is the time value of money—roughly, the current interest rate (if I took this year's tax savings and put it in the bank, would the interest after taxes exceed $500 by the end of 1987?).

For some people, a buck in the hand is

> For some people, a buck in the hand is worth more than a deduction in tomorrow's bush.



worth more than a deduction in tomorrow's bush. For others, the restrictions on the Section 179 deduction are significant. If the early deduction doesn't work out well for your business, don't worry. It's elective, not mandatory. A business can still choose to use the normal depreciation deduction and the investment tax credit shown for the investor in Figure 1.

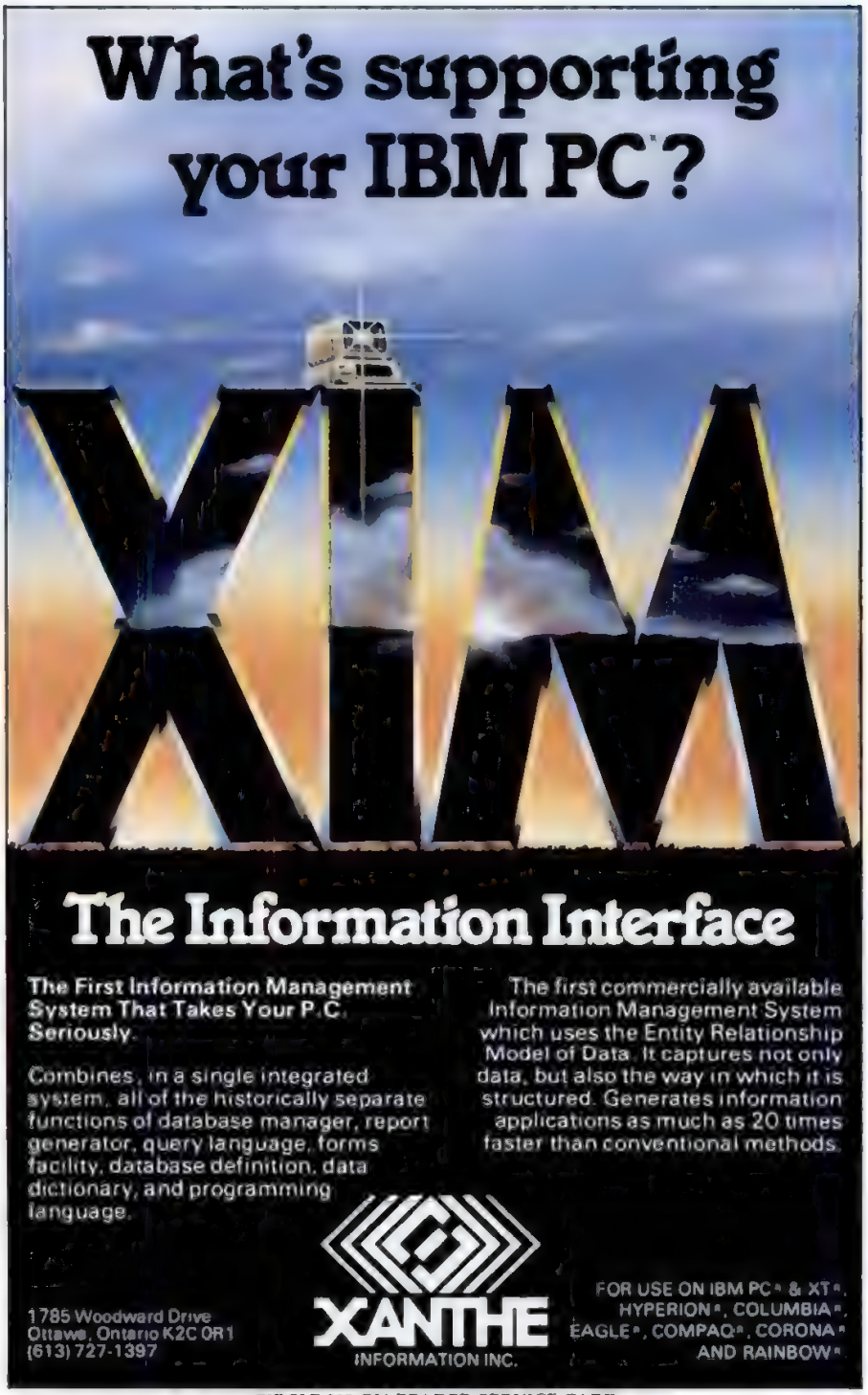
What about hobbyists—do they get deductions too? Not unless they intend to make a profit from the computer, says the big print. How can you tell the difference between a hobbyist and a dedicated entrepreneur who hasn't struck pay dirt yet? Turn to the fine print in Section 183 (d) of the tax code and you'll discover that there's a presumption that the taxpayer does have a profit motive if she can manage to squeak past the break-even point to make a profit in 2 out of 5 consecutive years. No, we're talking short run here. Well, in that case, a hobbyist is entitled to deduct as much in computer expenses as she has earned from the computer.

If you didn't buy a computer in 1983, don't despair. It gets better as we go along.

But before you sell your program to Intergalactic Software, Inc., can you deduct anything? Depends on how seriously you are pursuing profits. What expertise do you bring to bear? How much time and effort do you spend? What's your track record? At a tax audit you may wind up splitting the difference, with part of the depreciation deductible and part a nondeductible personal expense.

If you didn't buy a computer in 1983, don't despair. It gets better as we go along. The ceiling on the Section 179 deduction rises to $7,500 for items you buy in 1984 or 1985. And if Congress doesn't change its mind before we get there, the maximum annual deduction will be $10,000 for 1986 and later years.

Just think: If you bought the bare basics last year, this year you can deduct the graphics plotter, the letter-quality printer with the tractor feed, and the hard disk, and next year the color monitor, the modem, and the mouse. Thank you, IRS. ■



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Electronic Investment Advice

Although it can't buy and sell stocks for you, the Evaluation Form from Investor's Software can help you take control of your investment portfolio and make better financial decisions.

Most stock investors rely on a broker for advice and guidance because they don't have the time or the background to make investing decisions on their own. Unfortunately, relying on a broker's advice removes decision-making from the investor's control. This may be acceptable to investors who lack the time to properly manage their holdings, but many of today's investors want to control as many elements of the stock selection process as possible. The personal computer, combined with software such as *The Evaluation Form* from Investor's Software, can allow them to do just that.

Computerized stock selection aids can help investors analyze technical market indicators or manipulate fundamental company data without the aid of a broker. Technical analysis focuses on the trading patterns of individual stocks within the overall market. The objective is to predict how the price is likely to move in the future. Since no consideration is given to the ability of the company to support a rising price, such projections are inherently short-lived. Stock investors who use technical analysis often move in and out of several issues within a single trading day.



The Evaluation Form, on the other hand, was designed for investors interested in fundamental analysis of company data. Fundamental analysis is better suited to more long-term goals. It evaluates the underlying finances and management capability of a company. Fundamental analysts often spend weeks or months evaluating company data and manipulating it according to specified rules for stock selection. Once they have selected a portfolio and are satisfied with it, they will, typically, buy the stocks and hold them for approximately 2 to 3 years.

The Evaluation Form is easy to use. The stock selection process starts with a trip to a library or brokerage house to obtain published data from Standard and Poor's or Value Line's investment reference services. The data to complete *The Evaluation Form*'s library form data-entry sheet is found in the stock reference data provided by these services. Once you have selected the stocks you are interested in, copy the data onto the library form. Take this back to your computer and enter the information into *The Evaluation Form*.

The program carefully guides the investor through the data-entry process. The prompts follow the format of the library form. If changes need to be made, the program prompts the user at several points for data alterations.

Program operation

To show how the program works, let's run through the way you'd use it on an IBM PC. After loading the START program module, you are given three choices: 1) enter data, 2) display *The Evaluation Form,* or 3) print *The Evaluation Form.*

Data entry is prompted one line at a time in groups of seven to ten lines. At the end of each group, the program asks you if you want to make any changes (Y/N?). Answering no (N) allows the next line to be prompted. A yes (Y) answer brings a request for the line to be changed. Upon entering a number, you are prompted for the line to be changed. After changing the

The Evaluation Form
Investor's Software
Box N
Bradenton Beach, FL 33510
(813) 778-5515
List Price: $80
Requires: 64K RAM, one disk drive.

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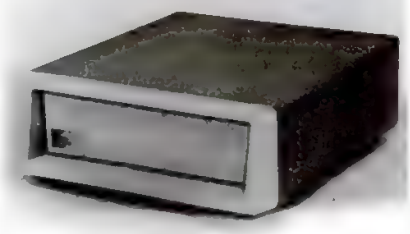
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line, the group is displayed with the changed data in the proper position. This simple procedure helps ensure that data is entered accurately. This is important since there are 57 input-data elements.

When all the questions have been answered, the system stores the answers and allows you to return to the main menu.

At this point, choosing to display or print the evaluation form results in the computation of the information. Most of these computations are completed in a few seconds. Other calculations are made prior to displaying or printing each section of the evaluation form. The printing stops for a few seconds as the calculations are performed. As each section is displayed or printed, you are again asked if you want to alter any data. Answering yes (Y) results in prompts for the various lines of data entered in that section.

You can enter all the required data in about 10 minutes or less. The computations take only a few seconds for each group of data. The program supplies approximately 50 calculated values on two printed pages. (See Figures 1 and 2 for examples of parts of a typical printout.) The total time to complete the evaluation form for each stock (provided you have all the necessary data) is about 15 minutes, compared to about 45 minutes to perform the calculations manually. Your productivity is increased about three times with improved accuracy as a by-product.

You should look out for two kinds of errors. During the set-up procedures, you must read the screen messages carefully and do exactly what they say. I erroneously formatted the program disk instead of a blank one because I didn't read the instructions carefully before pushing the Enter key. A second screen message at this point (in blinking and inverse format) would remind users that pressing Enter without waiting for further instructions erases the data on the disk.

Also, I found that if I mistakenly chose the data-entry function instead of the display or print functions, there was no easy way to get back to the main menu. I would like to see an option displayed at the bottom of each screen (such as Ctrl-C, Esc, or a function key) that would return you to the main menu. Features such as these would help prevent new users from going off the tracks. Otherwise, *The Evaluation Form* is designed to minimize errors.

```
BUY-HOLD-SELL RANGES

 61.08  --TO--  107.45  BUY RANGE
107.45  --TO--  153.83  HOLD RANGE
153.83  --TO--  200.20  CONSIDER SALE
BEST BUY would be less than $ 84.27.
```

Figure 1: *An example of buy, hold, and sell ranges computed for IBM stock by* The Evaluation Form, *as of January 5, 1984.*

```
FORECASTING HIGH & LOW PRICES :

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Avg. Low P/E & Est. Low EPS   82.19
Avg. Low Price (5 yrs.)....   61.56
Lowest Price of last 3 yrs.   48.40
Price Div. will support ...   52.18
                              -----
Avg. = FORECAST LOW PRICE .$  61.08

UPSIDE/DOWNSIDE RATIO is ..    1.49
```

Figure 2: The Evaluation Form*'s forecast of high and low prices for IBM stock.*

According to Investor's Software, the second version of *The Evaluation Form* will correct these problems and contain several functional enhancements, including a graph of earnings, dividends, and projected earnings.

Documentation

The hardest part of using *The Evaluation Form* is correctly interpreting the output. Its documentation can help the investor in this task. *The Evaluation Form*'s documentation comes in a 6- by 9-inch spiral-bound booklet. It consists of nine chapters and two appendixes. The chapters cover everything from how to set up and use the program to how to interpret the results of your stock analysis. The latter is especially important even for experienced stock investors because it provides additional insight into the methodology used in *The Evaluation Form*.

Chapters 1, 4, 5, and 9 provide background information to assist the user in

understanding the program's methodology. This includes brief discussions of technical versus fundamental analysis, the need for continuing one's education in stock investing, ways to locate stock performance data, and a summary of stock evaluation principles. These principles are useful as additional criteria for making your final selections. The last chapter is a glossary of stock investment terms that is handy both as a refresher and for specific reference to unique terms.

Chapter 2 and Chapter 3 assist you in setting up the system and entering and changing data. The remaining chapters show how to interpret the data and make judgments based on the program's computations. These chapters are important because the judgments may determine whether or not you make money.

Although the booklet is relatively easy to follow, the new investor may have trouble understanding some of the terms used, even with the included glossary. A certain amount of familiarity with fundamental stock-selection techniques greatly eases use of *The Evaluation Form*.

This is something that Investor's Software is clearly concerned about and it has gone to considerable lengths to ensure that reliable results can be obtained with the program. Nevertheless, the documentation retains a few rough edges in format and layout, phraseology, and clarity of investor terminology.

Summary

The Evaluation Form is an excellent aid to the fundamental analysis of common stocks. Investors can use these techniques to significantly reduce the time required to make the numerous computations that are part of such analyses. The effect is a more finely tuned stock portfolio resulting in greater profitability. ■

Donald R. Woodwell, a senior business analyst for IBM, has been with the company for 15 years. He is the author of numerous books and articles dealing with personal computers and finance.

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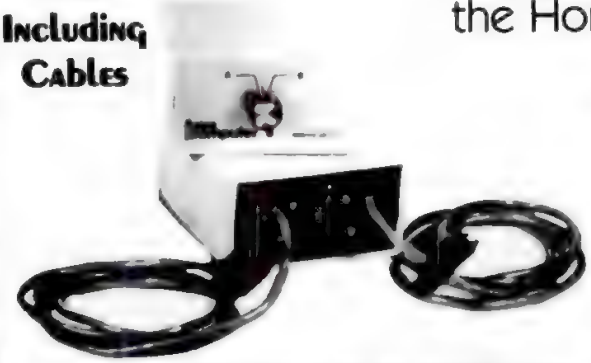
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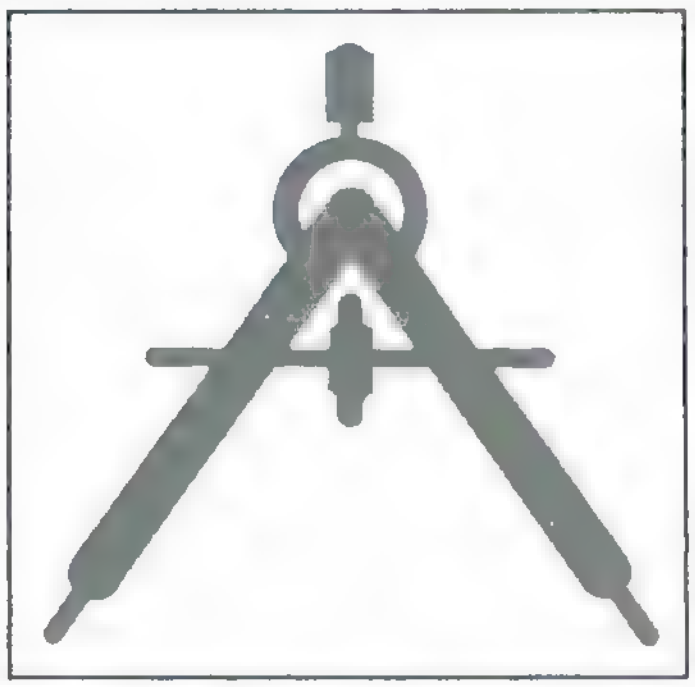
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Both programs are "pixel based," which means that images are stored in memory with the same resolution as the graphics display. But *PCcrayon* offers a choice of either IBM PC medium- or high-resolution graphics, whereas *4-POINT* uses only IBM PC medium-resolution graphics. Of course, if this were the only difference between the programs, choosing which one is right for your needs would be a simple task.



PCcrayon
PCsoftware of San Diego
9120 Gramercy Dr., Suite 416
San Diego, CA 92123
(619) 279-2482
List Price: $44.95
Requires: 64K RAM, color/graphics board, one disk drive.

CIRCLE 687 ON READER SERVICE CARD

4-POINT Graphics
International Microcomputer Software, Inc. (IMSI)
633 Fifth Ave.
San Rafael, CA 94901
(415) 454-7101
List Price: $195
Requires: 128K RAM, color/graphic board, one disk drive.

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Creating Pictures

PCcrayon uses a popular approach to creating and editing pictures: You position a single cursor one or more times to select parameters, which are then used with a particular command to build the desired figure. For example, an Area Move command might prompt you to move the cursor to the top left and lower right corners of an imaginary rectangle to show the area to be moved. A circle is made by one cursor movement to a center point, another movement to define the radius.

In an innovative departure from this method, *4-POINT* offers four separate program modes: one point, two point, three point, and four point—hence its name. The current mode tells how many cursors, or "points," are available.

Commands are performed in the mode most suitable for their implementation. An arc, defined by three points, is created in the three-point mode using the three available cursors. A line connects two points so the line command is found in the two-point mode.

The flexibility of the four-point system opens many unique design possibilities. For example, combining the two-point cursors with an automatic Cursor Move command when drawing a line creates fanning lines between the two cursors. This command combination can yield that "controlled accident" effect that painters often use advantageously on canvas. The same command, combined with circle drawing in the one-point mode, can produce dimensional effects that simulate movement through a curving tunnel.

Minding the Storage

PCcrayon's method for creating and storing graphic symbols differs from *4-POINT*'s in several ways. It uses two types of special symbol files: *vector* and *graphic*. Each vector file contains up to

256 symbols organized by ASCII codes. Stored in outline form, the symbols may be scaled or rotated when inserted into a drawing, or filled in afterwards. The contents of a vector file may be viewed at any time, and the images and codes may be printed as hard copy for easy reference.

PCcrayon's method has two distinct advantages. Frequently used symbols are easily organized and referenced, and the ASCII storage feature means that vector symbol files can contain fonts. The Text command takes advantage of this feature, permitting users to specify any vector symbol file as the current text library for tremendous flexibility in font selection.

PCcrayon's graphic symbols are also stored in special symbol files, but they are referenced by name instead of by ASCII code. Graphic symbols are solid images that can be inserted into a drawing but that cannot be scaled.

One vector and one graphic file are included with the *PCcrayon* package. Sets of optional graphic files and vector font files may be ordered separately from the manufacturer, PCsoftware.

Homemade Symbols

What if you choose to create your own symbols or modify existing ones? *PCcrayon* supplies grids and special utilities to ease this process for vector symbols. Circle and arc commands, however, are not valid during vector symbol creation. Graphic symbols are created by capturing an area from a main drawing. *PCcrayon* also provides documentation and source code for reusing the symbol files in user-written BASIC programs.

To create symbols with *4-POINT*, you capture an area in four-point mode and either store it in one of two image buffers or save it as a disk file for future use.

Multiple font styles are not available in *4-POINT*. Standard IBM ROM fonts are the only choice, although these characters may be stretched, scaled, compressed, or rotated. Custom fonts can be created and stored in files and then individually inserted into a drawing, but unlike *PCcrayon*, they would not be supported by the Text command for keyboarding straight text.

In animation mode in both programs, the sequence of steps involved in creating an image are stored in memory. By recreating the sequence of these steps rapidly, breathtaking animation is possible.

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PCcrayon has a Back-Out command for recovering erroneous steps, and its file format allows direct editing of the animation files with a text editor. Here *4-POINT* is clearly lacking: A Test command lets you preview a step before committing yourself, but there is no way to edit the sequence short of starting over.

One Prompts, the Other Doesn't

PCcrayon is well equipped with prompts to carry you through many commands. Unlike the program itself, the documentation is disorganized, but a company spokesperson has promised that it will appear in a new and improved version.

In contrast to *PCcrayon*, *4-POINT* does not prompt the user through the program; many keyboard commands must be memorized. The burden is lessened, however, because the commands, cursor modes, documentation, and quick-reference card are logical and well organized.

Both *4-POINT* and *PCcrayon* support hard-copy devices. The latter supports only the DOS 2.0 graphic screen dump for the Epson Printer, whereas *4-POINT* comes with its own powerful Epson printer driver. The driver lets you control the ratio of print head pins to screen pixels for control over hard-copy image size and aspect ratio. It also lets you match screen colors to gray scale on the hard copy.

At present, *PCcrayon* supports only the keyboard. The lack of other input devices is unfortunate since the program is a natural for joystick, touch tablet, or mouse control. Optional input device drivers for *4-POINT* support the Logitech and Microsoft mice and the Kurta graphics tablet.

PCcrayon provides utilities for passing images to or from user-written BASIC programs. Its competitor promises this feature soon to current program owners.

Faced with this polyphony—not to say cacophony—of pros and cons, which program should you buy? If multiple-font styles, extensive management of vector and graphic symbols, or 640-by-200 graphics are important to you, consider *PCcrayon*. Where price is a factor, *PCcrayon*'s $44.95 price tag is unbeatable. At one fourth the price of *4-POINT*, it's one of the best values around in IBM PC graphics software. If you need the added features now that *4-POINT* offers and want to be able to use a variety of input/output devices, its $195 price tag is well justified. ■

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A half-height Winchester disk drive designed to withstand shocks of up to 40 gravities. The ST212 incorporates low-mass, mini-slider ferrite heads, providing an average access time of 65 milliseconds using a conventional stepper-motor driven actuator. The drive's track density rating is 550 tracks-per-inch, with a total of 612 tracks per surface, divided into two 306-cylinder bands.

(List Price: $1,295)
Seagate Technology
920 Disc Dr.
Scotts Valley, CA 95066
(408) 438-6550

CIRCLE 738 ON READER SERVICE CARD



***ST212 Drive,** Seagate Technology*

Complexx LVS 76.8

A limited-distance modem, permitting data to be sent over 22-gauge wire to distances up to 16,250 feet (5000 meters), at the unit's maximum baud rate of 76.8K. The modem allows the user to select from eight synchronous data transfer speeds (2400 baud to 76.8K baud) by means of a thumbwheel switch. Alternatively, the unit can be operated at any speed using an outside clock.

The LVS 76.8 also incorporates a Bell 43401-compatible switch, which permits the device to operate within the boundaries established by the Bell 43401 document. To activate the optional protocol, the user simply switches on a toggle at the rear of the unit.

The LVS modem is preprogrammed to provide standard EIA and line loopback testing. Such tests can be performed from either end of the line, and either end can perform its own local or remote loopback.

The unit's front panel has L.E.D. indicators for power, data transmit, data receive, carrier detect, and testing. The user has a choice of either an RS-232 or V.35 interface.
(List Price: $650)

Complexx Systems, Inc.
4930 Research Dr.
Huntsville, AL 35805
(205) 830-4310

CIRCLE 737 ON READER SERVICE CARD

Power Line Network (PLN)

A unit that serves as a computer networking tool, permitting up to 254 systems to be linked together. The PLN units communicate over 110 volt power lines, and can connect to any computer with an RS-232 port. In addition, the PLN can interface with printers and other peripherals, and has an on-board 2K byte buffer memory. Each PLN has its own address that is set by the user.

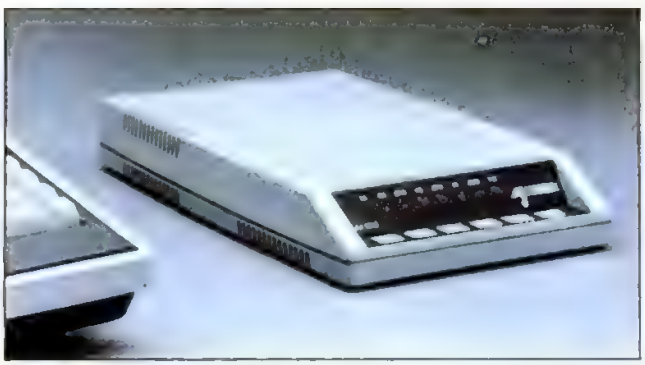
The PLN units are available in three configurations: Master (PLN-M), Controller (PLN-C), and an analog-to-digital PLN-A. The Master PLN receives commands from the user's system via an RS-232 link and relays them to the appropriate PLN. Two or more Master units can be used for communications between computers or peripherals.

The PLN-C unit has 8 I/O ports for turning on and off or sensing switch closures, and a controlled AC power plug. The power plug is controlled by the Master PLN unit, which can remotely turn equipment on or off, and vary the voltage level by phase control.

The analog-to-digital PLN unit offers the same features as the Controller unit, except that it also has a 4-channel, 8-bit analog-to-digital converter. This A/D converter allows the monitoring of up to four analog inputs with a voltage range of 0 to 5 volts. A 5 volt reference voltage is also provided for ratiometric sensors.

(List Price: $499)
Mollard Systems Design, Inc.
1977 O'Toole Ave., #B106
San Jose, CA 95131
(408) 280-7900
(408) 943-0163

CIRCLE 750 ON READER SERVICE CARD



AJ212A/103 Modem, Anderson Jacobson

212A/103 Modem

A low-profile 300/1200 baud modem incorporating touch-panel controls with indicators, an integral power supply, automatic 9/10 character detection, and built-in diagnostic routines. The AJ 1212-ST modem is an auto/manual originate and auto/answer modem for switched telephone network operation in both Bell 212A and Bell 103/113 protocol. It automatically identifies incoming calls and sets itself according to the appropriate data rate. In addition, it guards against data loss due to inadvertent lifting of a telephone handset during data transmission.

Eight front panel indicators show the unit's operating state, such as Power On, Ready to Communicate, Transmitting Data, or Error Condition. Diagnostics performed by the unit include analog and digital loopback tests, capable of verifying correct operation locally or from a remote location.

(List Price: $495)
Anderson Jacobson
521 Charcot Ave.
San Jose, CA 95131
(408) 286-7960

CIRCLE 742 ON READER SERVICE CARD

Ultrasonic III Messenger

A typewriter which can be dealer-converted to double as a printer. As a typewriter, the unit offers features such as full-line memory correction, three type pitches (10, 12, or 15 characters per inch), automatic underlining, and automatic centering.

When equipped with the Messenger Module interface, the typewriter becomes a full-featured letter quality printer.

(List Price: $635; Messenger Module $170)
Smith Corona
65 Locust Ave.
New Canaan, CT 06840
(203) 972-1471

CIRCLE 741 ON READER SERVICE CARD

TURBO-DISC

A high-performance Winchester disk drive, featuring 12 Read/Write heads on each side of the disk instead of just 1. The unit's head slider assembly is mounted on a parallelogram, which moves the heads across the disk surface in 1/12th the time and distance of a single head per surface.

The TURBO-DISC drive is available as a 20 megabyte subsystem. The 20Mb unit offers 5 megabytes fixed and 5 megabytes removable, plus 10 megabytes of additional storage in the form of two removable car-

tridges. The subsystem includes a host interface board, internal power supply, a disk controller, and two types of connecting cables plus utility software. In addition, units ordered with an in-bus interface card offer the user two additional card slots within the Winchester's enclosure.

The 10 megabyte subsystem maintains 425,000 characters of data under the drive's 48 heads at all times, providing data access times averaging 16 milliseconds. When not in use, the heads are protected from crashing onto the plated media by a head-lifting system that physically locks the heads above the surface of the disk. The subsystem's fixed/removable architecture (two logical drives), serves to provide the user with data redundancy and off-line data security.

(List price: $4,950)
New World Computer Co., Inc.
6624 Owens Dr.
P.O. Box 1479
Pleasanton, CA 94566
(415) 463-0330

CIRCLE 752 ON READER SERVICE CARD

Signalman Mark XII Modem

An auto/originate, auto/answer modem which accepts the same command structure as the Hayes Smartmodem.



MultiDisplay Board, Paradise Systems, Inc.

The Mark XII modem can operate manually via keyboard, without computer coding. Alternately, it can answer and originate calls at 1200 bits per second (Bell 212A protocol) or 300 bps (Bell 103 protocol) automatically under software control. The modem detects dial tone and busy signals automatically, displaying its status on the user's CRT screen.

The Signalman Mark XII modem uses a standard serial RS-232 interface with a built-in cable. It comes equipped with two telephone jacks (for the user's system and a separate telephone) and cord and can be directly connected to existing phone lines.

(List Price: $399)
Anchor Automation
6913 Valjean Ave.
Van Nuys, CA 91406
(213) 997-6493

CIRCLE 740 ON READER SERVICE CARD

MultiDisplay Board

A plug-in board offering a color display controller, monochrome display controller, and parallel printer interface in a single slot. The board provides an external switch permitting the user to choose between displays. Software such as Lotus' *1-2-3* can make use of either display, as the card also permits choice of monitor to be made under software direction.

The MultiDisplay Card features flicker-free scrolling and separate connectors for composite color, RGB color or a color television with an RF modulator, and a monochrome monitor. Other devices, such as a light pen, can also be controlled with the card.

The parallel port provided by the board is compatible with standard parallel printers and other devices.

(List Price: $595)
Paradise Systems, Inc.
150 N. Hill Dr.
Brisbane, CA 94002
(415) 468-5320

CIRCLE 745 ON READER SERVICE CARD

EMS Touch Panels

Custom-designed accessory panels for CRT displays which convert a monitor into a touch-sensitive input device. The panels incorporate rows of L.E.D.s and phototransistors surrounding the display screen. With the panel installed, contact with any point on a screen interrupts a grid of infrared light beams, and data is transmitted to the user's system.

Panels are available in two basic configurations: a box frame, suitable for the majority of CRT displays; and a window frame, designed for flat displays. The box frame fits between the CRT tube and its enclosure, while the window frame is mounted directly in front of a screen.

The touch panels can be used in a wide range of applications. Models are available for standard monitors, though each panel must be customized to operate properly with a user's system and application software.

(List Price: Available from the manufacturer)
Electro Mechanical Systems, Inc.
801 W. Bradley
Champaign, IL 61820
(217) 359-7125

CIRCLE 748 ON READER SERVICE CARD

Vista Dynaframe

A Winchester hard disk enclosed within an expansion chassis. The Dynaframe unit's hard disk offers storage capacities from 5 to 140 megabytes and includes a controller card that is compatible with PC-DOS 2.0 with an error-correcting facility.

The unit's expansion chassis enclosure provides the user with an additional eight slots for plug-in cards; a front Touch-Panel/Display allowing the user to monitor active banks of RAM; a RESET function; and Disc-Loc, a proprietary hardware function to write-protect the hard disk from accidental erasure or loss of data.

(List Price: $2,449-$9,995, depending upon storage capacity)
Vista Computer Co.
1317 E. Edinger
Santa Ana, CA 92705
(800) 854-8017
(714) 953-0523

CIRCLE 747 ON READER SERVICE CARD



***EMS Touch Panels**, Electro Mechanical Systems, Inc.*

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CIRCLE 280 ON READER SERVICE CARD

Time Spectrum SB384

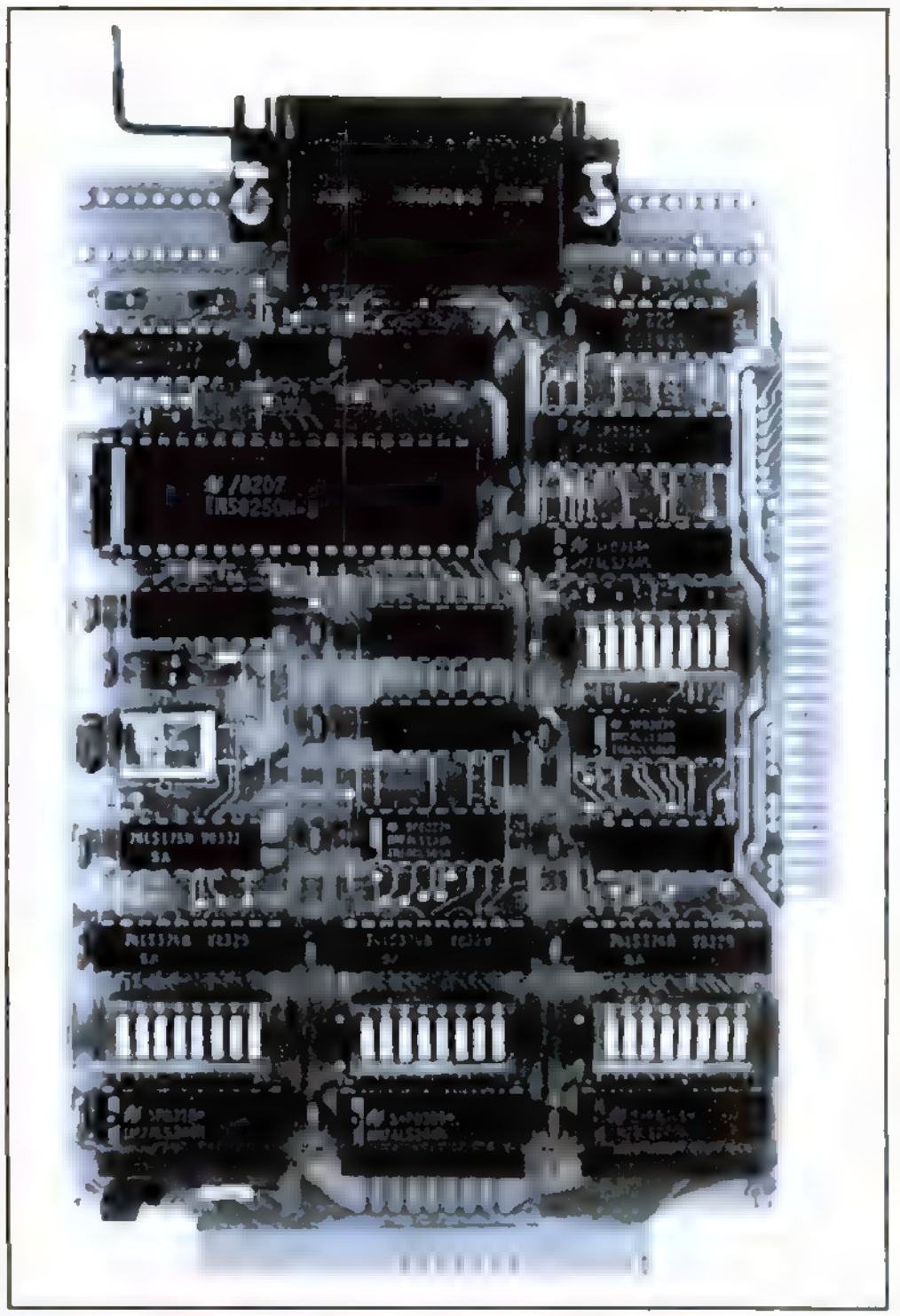
A plug-in memory expansion board allowing the user to add up to 384K of RAM to a system already fully configured with 256K RAM. With the resultant total of 640K, software running on the user's system can take full advantage of the maximum amount of memory supported by PC-DOS. In addition, the expanded memory provides ample space for electronic RAM disk emulators and print spooling utilities.

As standard features, the Time Spectrum SB384 board also offers socketed RAM, a calendar/clock with rechargeable battery backup, one serial asynchronous communications port, and one Centronics parallel printer port. The board also features parity checking and error reporting, switch-selectable addressing on any 64K boundary, and switch-selectable memory size. An optional game port for joysticks is also available.

Software provided with the board includes the Persyst *Insta-Drive* disk drive emulator, and the *WaitLess* print spooler. The former serves as a fast-access RAM disk providing up to 320K of user-assignable storage capacity. The latter provides automatic spooling for both serial and parallel printers, with a user-defined buffer capacity.

(List Price: $395; game port module $50)
Personal Systems Technology, Inc. (Persyst)
15801 Rockfield Blvd., #A
Irvine, CA 92714
(714) 859-8871

CIRCLE 751 ON READER SERVICE CARD



***PC-SPI Industrial Interface,** Adams OEM Products*

Turtle Tot

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The turtle concept was originally used to introduce Logo, the high-level programming language used in educational computing. This particular model is designed so that it can be controlled even by preschoolers.

(List Price: $299)
Harvard Associates Inc.
260 Beacon St.
Somerville, MA 02143
(617) 492-0660

CIRCLE 736 ON READER SERVICE CARD

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A plug-in card incorporating three parallel and either one RS-232 or one RS-422 serial port. The board permits the user to interface various industrial serial/parallel data acquisition and control peripherals to a system.

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(List Price: $219)
Adams OEM Products Div.
P.O. Box 8339, Sta. A
Greenville, SC 29604
(803) 233-4342

CIRCLE 739 ON READER SERVICE CARD

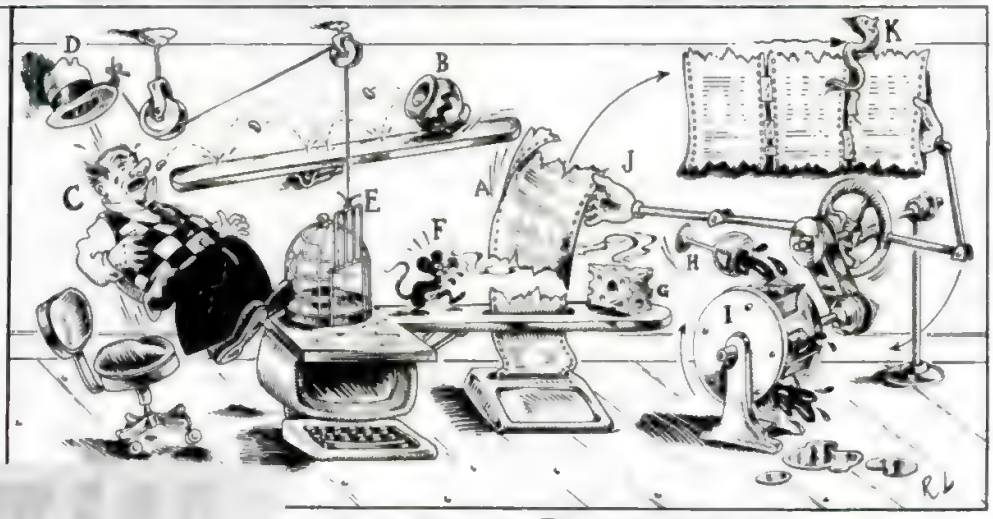
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IN A FIT OF PIQUE HE SPILLS VINTAGE WINE (H) INTO WATER-WHEEL (I) WHICH TURNS PULLEY THAT CAUSES GLOVE (J) TO GRASP SPREADSHEET AND MOVE IT TO TAPING AREA.

SHEET IS TAPED SECURELY IN PLACE BY TRAINED ADHESIVE TAPE WORM (K).



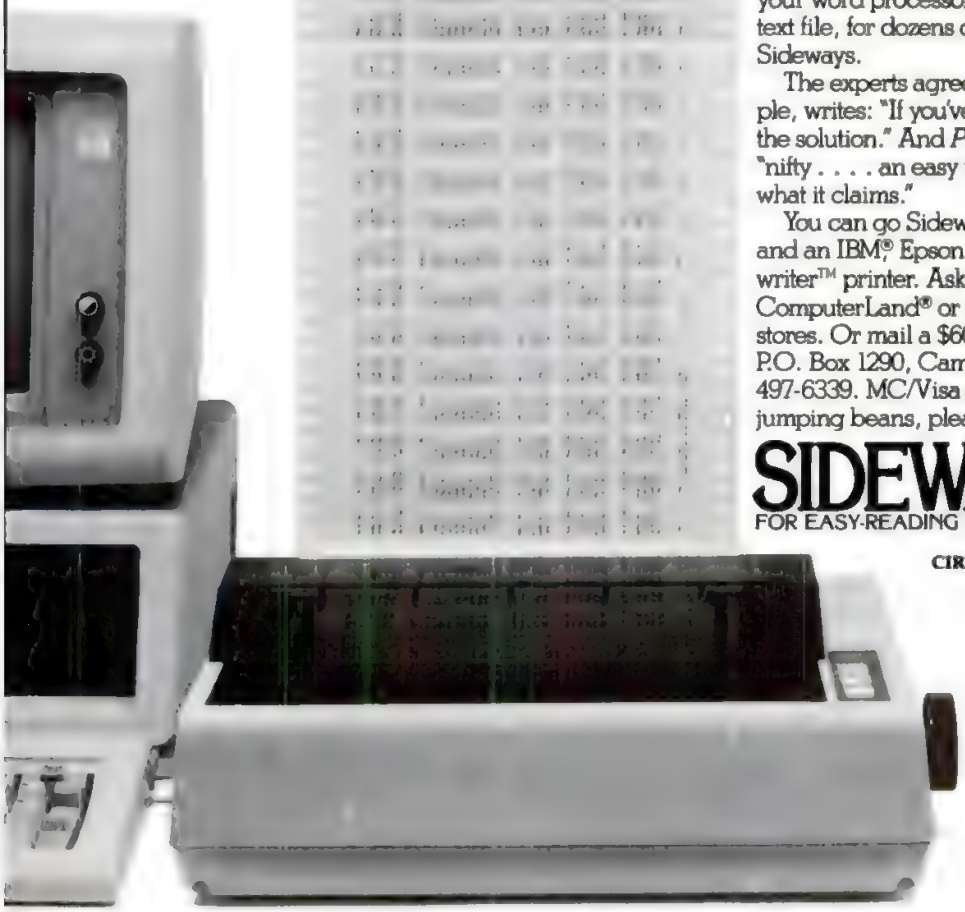
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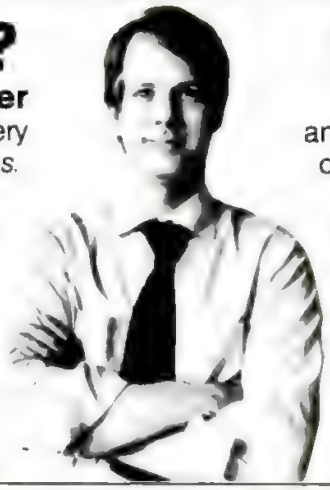
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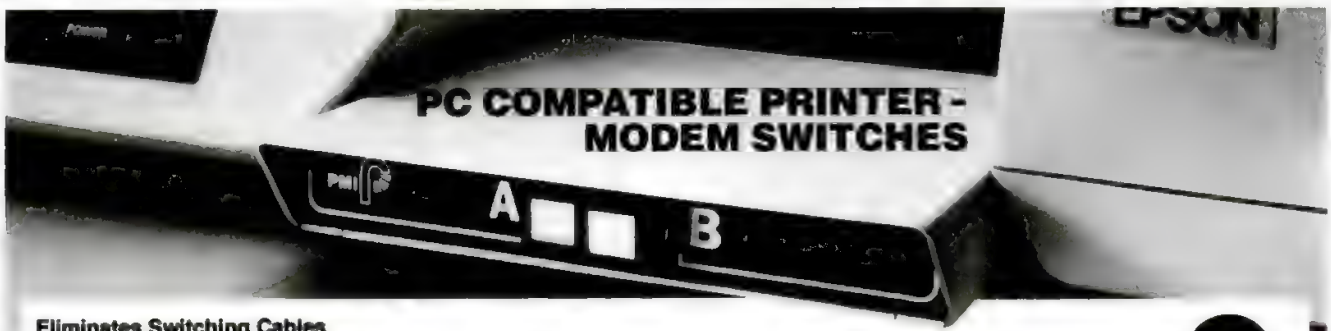
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*Pins 2-8, 12-24, pin 1 bussed, pin 11 tied to pin 19. IBM PC is a registered trademark of IBM Corporation.

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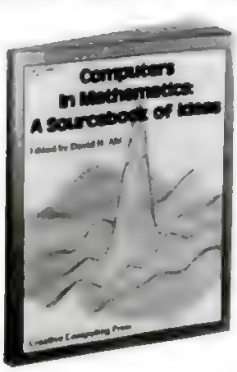
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MT-440 Printer, Mannesmann Tally Corp.

MT-440 Printers

A series of three high speed serial printers offering features such as special paper feeds, variable-quality printing, user-programmable type pitch, and four type fonts. The dot matrix printers run at 400 characters per second (cps) in the draft mode and 100 cps in the correspondence mode. A bar code printing model is also available, which can operate at 270 cps.

The three models in the series are designated MT-440-I, MT-440-L, and MT-440-D. The MT-440-I offers draft-quality printing only at 400 cps, dot-addressable graphics capability, and a single set of tractors for paper feeding. The MT-440-L adds a two-pass correspondence mode at 200 cps, and offers a dual-tractor paper handling system, where one set pulls paper into the printing area, and a second set pulls the paper into the output bin.

The MT-440-D is designed to print bar codes, as well as the special characters required by optical character readers. It also features the dual-tractor paper-handling mechanism.

All three models can accept paper fed from either the top or bottom of the units, and can be fitted with a user-installable single-sheet feeder and a quick-tear edge.

(List Price: MT-440-I $2,395; MT-440-L $2,695; MT-440-D $2,995)
Mannesmann Tally Corp.
8301 S. 180th St.
Kent, WA 98031
(206) 251-5500

CIRCLE 746 ON READER SERVICE CARD

SOFTWARE

Datalife Disk Drive Analyzer

Software allowing a user to check the performance of a floppy disk drive. *The Disk Drive Analyzer* runs four comprehensive tests to check head alignment, disk clamping, write/read accuracy, and disk speed. It can then display a read-out with good, fair, or poor evaluations as well as pass/fail ratings indicating whether tested areas will require adjustment or repair.

The *Datalife Disk Drive Analyzer* is available on a single 5¼-inch diskette. *(List Price: $39.95)*
Requires: 64K, one disk drive, PC-DOS.
Data Encore
585 N. Mary Ave.
Sunnyvale, CA 94086
(408) 720-7400

CIRCLE 762 ON READER SERVICE CARD

TBM/CPA

A time, billing, and management program for CPA and accounting firms. The software provides simplified data entry and edit procedures, audit trails, and billing procedures that utilize a billing memo sheet listing all unbilled charges for a client. Also featured are flexible management reports that can be customized by the user.

All of *TBM/CPA's* data

entry operations, edit and correction procedures, master file updates, and management report creation procedures are initiated by selections from system menus and responses to prompts.

TBM/CPA is written in *dBASE II* and is distributed with a copy of the *dBASE II RunTime* module.
(List Price: $1,295)
Requires: 96K, two 320K drives, PC-DOS or CP/M-86.
Sun Management Systems, Inc.
3400 Bissonnet, #270
Houston, TX 77005
(713) 661-7270

CIRCLE 766 ON READER SERVICE CARD

Letterform 1000

A specialized database, containing over 1,000 letters and forms on diskette. The pre-formatted letters can be read, personalized, and printed using almost any word processing program.

The letters and forms cover a wide range of situations, including accounting and collection, employer/employee relations, general business, goodwill and sales promotion, legal, ordering and shipping, personal, schools, charities, and similar organizations. All of the letters are categorized and indexed in the supplied documentation manual.



Letterform 1000, PBL Corp.

The manual also contains abbreviations, proper headings, titles and forms of address, academic degrees, abbreviations for government agencies, state abbreviations, Canadian Provinces, complimentary closings, and appropriate anniversary gift suggestions.

Letterform 1000's letters and forms are in standard ASCII text files. The user reads a letter with a word processing program in the same manner as the user's own text files are called and read. The package contains four to five diskettes.

(List Price: $95)
Requires: 64K, one 320K drive, PC DOS, word processing software.
PBL Corp.
P.O. Box 559
320 Manitoba Ave.
Wayzata, MN 55391
(612) 473-8998

CIRCLE 754 ON READER SERVICE CARD

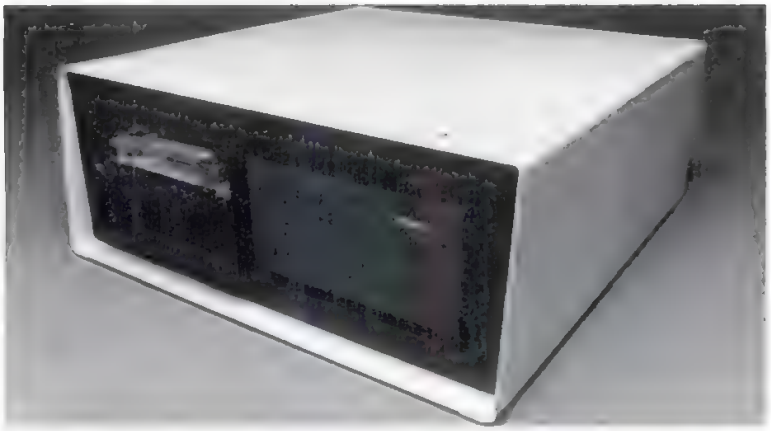
Capital Planning Model

A long-range capital planning program for hospitals and other health care institutions. The *Capital Planning Model* program can project operating statistics and staffing requirements for the institutions, as well as salary, benefit, professional fee, supply, and other non-salary expenses. For studies involving debt, it calculates the financial requirements of a project. It also projects patient revenues, contractual allowances, other operating revenues, and nonoperating revenues.

A project analysis component of the system can address a multiple-phased construction project to be financed through a single bond issue. It can calculate the bond issue size, sources and uses of funds, debt capacity, cash flow, and debt service requirements. In addition, the *Capital Planning Model* can generate income statements and balance sheets. The *Model* can also evaluate the results of alternative financing scenarios.

Other features of the software include the ability to help in preparing data for certificate of need applications, analyze merger and acquisition opportunities, evaluate reorganization plans, and prepare cost center operating statements.
(List Price: $7,500)
Requires: 128K, two 320K drives.
Ernst & Whinney
2000 National City Cntr.
Cleveland, OH 44114
(216) 861-5000, ext. 5987

CIRCLE 772 ON READER SERVICE CARD



$1495 for a complete 10 megabyte hard disk system is a good deal — but not if you need 23 megabytes of storage!

That's why our 23 megabyte hard disk system is priced at only $2249. And for another $895, you'll get 23 megabytes of tape backup security.

The Pegasus 10 and 23 come complete with all the software and hardware you need to start operations.

If you've outgrown the storage capabilities of your IBM PC or compatible computer but haven't grown into the giant pricetags on 10- or 23-megabyte hard disk systems, you're in for a surprise.

The price on these complete systems featuring the latest components just reached an all time low!

And you get everything you need to start working on your hard disk system:

- Top quality formatted fixed hard disk (ST506 compatible)
- Top quality controller card
- Software that runs on DOS 1.1 and 2.0, CP/M 86
- Host adapter
- Integral power supply
- Cables
- External custom chassis with additional space for either our tape backup, another hard disk, or floppy disk drive.
- 90 day warranty

What's the catch?

There is none. It's a simple matter of economics. Pegasus saw the growing need for mass storage, made a commitment to fill this need, purchased thousands of the finest quality hard disks, and is now passing the good deal along to you.

The only thing you may be missing in buying the Pegasus instead of the IBM XT expansion chassis is something you may not need in the first place: eight expansion slots, a communications card, three little initials, and an extra $1,000 to $2,000 out of your pocket.

But don't I need a tape backup for all that storage?

We recommend it! That's why we're offering you the same great deal on a ¼" cartridge tape backup. We've watched other companies offer 10 and 20 megabytes of storage and forget about the backup altogether. Our tape backup, which carries a 90 day warranty, retails for just $895 — a small price for over 23 megabytes of formatted storage and lots of peace of mind.

Where can I buy a Pegasus hard disk system?

Pegasus systems are available only through dealers. So contact the dealer in your area who sells IBM PC or compatible computers. If he doesn't have Pegasus, chances are he'll carry it soon. Just ask him to call us. We will ship him your Pegasus unit immediately.

Does Pegasus have larger storage systems?

Absolutely. 65 and 140 megabyte systems will soon be available from Pegasus. And the best part is that they, too, are breaking new ground when it comes to pricing. If you've outgrown 10, or even 23 megabytes of storage, ask about the larger capacity units. All with the same top quality hardware and software and full 90 day warranty.

GREAT LAKES
COMPUTER PERIPHERALS, INC.

2200 West Higgins Road, Suite 245
Hoffman Estates, Illinois 60195

Dealer Inquiries Invited **800-323-6836** In Illinois (312) 884-7272

CIRCLE 313 ON READER SERVICE CARD

Print Utilities

Two graphics programs permitting users with C. Itoh PROWRITER I/II or NEC 8023A printers to produce hard copy of graphics or special text.

PRINT_SCREEN is a screen dump program offering the user four options for printing either medium- or high-resolution graphics.

PRINT_CHARACTER allows the user to print a majority of the IBM character set (only control code characters used by the printer cannot be printed). Included with the program are 13 utilities capable of sending codes to set different modes of printer operation automatically. When *PRINT_SCREEN* and *PRINT_CHARACTER* are used together, text screens containing characters from the extended set (math, line graphics, and foreign language characters) can be printed.

Both programs are written in 8086 assembly language.

(List Price: Both programs $64.75; each $35)

Requires: 64K, one disk drive, PC DOS, C. Itoh PROWRITER I/II or NEC 8023A printer.

Soft & Friendly
R2, Box 65
Solsberry, IN 47459
(812) 825-7384

CIRCLE 756 ON READER SERVICE CARD



10-BASE, Fox Research, Inc.

Pertmaster

A multiple-activity project management program, offering users both Project Evaluation and Review Technique (PERT) and Critical Path Method (CPA) means of controlling projects. *Pertmaster* allows up to 1,500 activities per project network, accepts up to 29 different resources per activity, and can analyze and update a full project network in a matter of seconds.

In addition, *Pertmaster* permits users to produce bar charts and histograms describing projects via standard printers. Other features of the software include expanded project input capabilities, high-speed analyses, and compatibility with a number of widely used operating systems.

(List Price: $695)

Requires: 64K, two disk drive, PC-DOS.

Westminster Software, Inc.
3000 Sand Hill Rd., Bldg. 4
Menlo Park, CA 94025
(415) 854-1400

CIRCLE 761 ON READER SERVICE CARD

10-BASE

A relational database management system based upon the Sequel (SQL) relational DBMS language developed for IBM mainframes. The software is compatible with programs such as Lotus' *1-2-3, WordStar/MailMerge,* and other foreign programs.

The program uses English-like commands to create databases, organize tables, edit, delete, modify, query, manipulate, display, and print all or part of a data file. A single *10-BASE* command can draw data from up to 16 separate data files. In addition, the program offers an unlimited number of files and records per file.

Although the software can be used alone, *10-BASE* is especially designed to work with the producers' 10-NET local area network system that interconnects individual users' systems with inexpensive twisted pair wiring.

(List Price: $495)

Requires: 192K, one disk drive, PC-DOS 2.0.

Fox Research, Inc.
7005 Corporate Way
Dayton, OH 45459
(513) 443-2238

CIRCLE 757 ON READER SERVICE CARD

NEWS FOR BUSINESS USERS OF IBM MINI'S...

Announcing DBA 34/36... the RPGII Data Base

5 Reasons Why DBA 34/36 Will Increase the Facility, Speed, Accuracy and Flexibility of Your Information Processing and Lower Your New Business Applications Costs

Now there is a true data base management system (DBMS) for IBM System 34 and 36 users which organizes computer files into a single, coordinated information bank that is accessible in a variety of logical groupings—DBA 34/36 from Fits Systems Inc. Here are five reasons why you should be using it with your mini:

1. DBA 34/36 is the only data base management system designed for both the IBM System 34 and the new System 36—a true data base, not just a scaled-down version of mainframe software or retrieval tool.

2. DBA 34/36 makes it easy to define and produce recurring reports including simple user-defined calculations. All requisite support programs, including Data Base Maintenance, a powerful Universal Inquiry Program. RPG II Interface and a Report Generator come with the package.

3. Because DBA 34/36 is written in RPG II, your programmers can adapt any of its calling subroutines into your own programs, significantly reducing programming time for new applications.

4. DBA 34/36 can be up-and-running in less than a week because it does not change existing files. Instead, DBA 34/36 creates an external structure that manages references to your files with remarkable efficiency. An experienced programmer can install DBA 34/36 and have it running inquiry against your files in just a few days.

5. No schooling is required—your staff will quickly become proficient with DBA 34/36 by simply using the "user friendly" manual supplied with the package. The manual describes installation procedures and includes complete instructions for tailoring DBA 34/36's functions to reference the files selected for installation.

You Can Try DBA 34/36 For 45 Days FREE

We offer qualified users a free 45 day trial of DBA 34/36 in order to demonstrate what it can do for you. We'll send you a copy of the software, and complete installation documentation, for a 45 day free trial to use on your own system. We think you'll wonder how you ever did without it—but, if you're not completely satisfied, simply return the package—there's no further obligation.

Free Demonstration Disk Available



FITS

Casey Stern, Vice President
FITS Systems, Inc.
DBA Department
65 West Red Oak Lane
White Plains, N.Y. 10604
212-269-5540 • 914-694-1554

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☐ COMPLETE PACKAGE for 45-day free trial
☐ MORE INFORMATION—have a sales rep contact me.

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City_____ State_____ Zip_____
Telephone ( ) _____ Best Time_____

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CIRCLE 225 ON READER SERVICE CARD

CHART YOUR PROGRESS

SPECIALS OF THE MONTH



IBM System — Call for Pricing & Configuration

Novation 1-2-3 Modem w/Crosstalk	$463
Quadram 64K Ram Chips	$ 69
Koala Touch Tablet	$115
Quadlink (Apple/IBM Interface)	$539
AST Comboplus 256K	$525
Flip & File Diskette Box (Holds 50)	$22.50
Verbatim Disks (D/D)	$39.00
Maxell Disks (D/D)	$40.00
Orange Surge Protector	$95.00

HARDWARE SPECIALS

Printers

NEC 3530	$1795
NEC 7710	$2295
NEC 7730	$2295
NEC 3550	$1995
Diablo 620R (25 cps)	$1059
Diablo 630R (40 cps)	$2019
Diablo 630KSR (40 cps)	$2789
Okidata ML 84	CALL
Okidata ML 92	CALL
Okidata ML 93	CALL
IDS Prism 132 (w/sheetfeed, graphics and color)	$1629
Qume Sprint II	$1429

Monitors

Quadram Quadchrome	$529
Amdek Color II	$449
Amdek 300 Green	$179
Amdek 310 Amber	$189
Gorilla Hi-Res Green or Amber	$ 89
USI Amber	$159

Modems

Hayes 1200B	$439
Hayes 1200	$529
Hayes 300	$229
Anchor Automation Mark VI	$179

RECREATION

Avalon Hill Game Co.

B-1 Nuclear Bomber	$ 15
Midway Campaign	$ 15
Computer Stocks & Bonds	$ 17
Computer Football	$ 15
Computer Facts and Five	$ 17

Broderbund Software

Lode Runner	$ 25

Epyx/Auto. Simulations

Crush, Crumble & Chomp	$ 22
Temple of Apshai	$ 29
Upper Reaches of Apshai	$ 15
Curse of Ra	$ 15
Oil Barrons	$ 39

Infocom

Witness	$ 36
Planetfall	$ 36
Deadline	$ 36
Zork I, II, III	ea. $ 29
Starcross	$ 29
Enchanter	$ 36
Infidel	$ 36

Intelligent Statements

Ken Uston's Prof. Blackjk	$ 45

Microsoft

Flight Simulator	$ 36

Odesta

Chess	$ 49
Checkers	$ 36
Backgammon	$ 36

Sublogic Communication

"Night Mission" Pinball	$ 29

Sir Tech

Wizardry	$ 36

EDUCATION

Barrons

Barron's SAT	$ 59

CBS Software

Match-Wits	$ 22
Murder by the Dozen	$ 25
Mastering the College Board	$119

Counterpoint

Early Games for Young Children	$ 22
Early Games Match Maker	$ 22
Early Games Piece of Cake	$ 22

Davidson & Assoc.

Word Attack	$ 36
Speed Reader	$ 49
Math Blaster	$ 36

Designware

Spellicopter	$ 29
Mathmaze	$ 29
Creature Creator	$ 29
Spellikazam	$ 29

Eduware

Algebra I (req. color graphics)	$ 29

Harcourt Brace

S.A.T.	$ 89

Inet

Speed Read +	$ 53

Learning Co.

Moptown Parade	$ 29
Moptown Hotel	$ 29
Magic Spells	$ 25

Scarborough

Mastertype	$ 36
Songwriter	$ 29

Sirius

Type Attack	$ 29

Spinnaker

Snooper Troopers 1, 2 ea.	$ 30
Face Maker	$ 25
Delta Drawing	$ 36
Alphabet Zoo	$ 22

BUSINESS

DBase II (MS DOS)	$459
Bank Street Writer	$ 59
Personal Acct/BPI	$139
General Acct/BPI	$429
A/R, A/P, Payroll/ BPI ea.	$429
Inventory Control/BPI	$569
Home Acct. Plus	$ 95
FCM	$ 79
Ultra File	$105
Concurrent CP/M 86	$249
CBasic 86	$145
Pascal/MT + 86	$289
Speed Programming 86	$139
CP/M 86	$ 40
Quick Code (CP/M 86)	$215
Quick Code (MS Dos)	$215
Smartcom II	$119
Real Estate Analyzer II	$159
Tax Preparer 1984	$179
Tim III	$355
Fast Graphs	$250
Easy Filer	$289
Easy Writer II	$249
Easy Speller II	$165
Easy Business System	$1075
Knoware	$ 69
The Tax Manager	$189
Wordstar	$325
Mailmerge	$189
Spellstar	$189
Dollars & Sense	$119
Microsoft Word w/Mouse	$339
Multi-Tool Financial Statement	$ 72
Basic Compiler	$285
Multiplan	$179
Fortran	$249
Crosstalk XVI	$139
Personal Investor	$139
Peachtree Series 8 ea.	$495
Peachtext 5000	$259
Norton Utilities	$ 59
SPI Open Access	$429
PFS Report	$ 85
PFS File	$ 95
PFS Write	$ 95
Multimate	$289
Supercalc III	$289
Visi On Graph	$195
Visi On Word	$295
Visi On Calc	$309

COMPUTER OUTLET

VISA

Information and Inquiries: (702) 796-0296 Order Status: (702) 369-5523.

COMPUTER OUTLET

1095 East Twain, Las Vegas, NV 89109 Mon.–Fri. 8 a.m. to 6 p.m., Sat. 9 a.m. to 5 p.m.

1-800-634-6766

SHIPPING: For fast delivery, cashier checks, money orders or direct bank wires. Personal and company checks, allow 3 weeks to clear. C.O.D. charges. $3 minimum or 1% on orders over $300. Nevada residents add 5¼% sales tax. Shipping charges based on weight $3 minimum. APO and FPO orders $10 minimum and 15% on all orders over $100. School and business purchase orders welcome. All returns must be accompanied by return authorization number. Call (702) 369-5523 before returning goods for replacement. Prices reflect cash discount only and are subject to change.

CIRCLE 162 ON READER SERVICE CARD



InfoPost, Info Designs, Inc.

INTERNATIONAL MAIL

A mailing label program, featuring expanded data fields; support for both standard-sized and over-sized (packing) labels; and a global attribute delete feature permitting listings to be deleted based upon user-defined criteria, and insuring that the same labels are not duplicated in a print-run. The expanded field capability includes fields for Province/State (up to 15 characters), Country (15 characters), and Postal Code (10 characters).

INTERNATIONAL MAIL also permits the user to search/display/print selected records based on up to 15 user-defined attributes for labels or lists. Second versions of existing records can be made by simply keying in only the modified fields. Other features of the software include the ability to sort records on any number of characters in any field(s), up to 64 characters total; store telephone numbers and extensions; and the ability to print up to 999 copies of the same label (for return address labels and such).

(List Price: $95)

Requires: 64K, two disk drives, PC-DOS, printer.

Data Consulting Group
877 Bounty Dr. #EE203
Foster City, CA 94404
(415) 571-8100

CIRCLE 767 ON READER SERVICE CARD

MBOS/5

A multi-user operating system for the PC/XT, giving users the capability of adding up to two additional inexpensive CRTs and achieving full file-sharing capabilities. Any program or system written in BOS/MicroCobol can run under *MBOS/5* without recompilation or relinking. Data files can be ported to the users' systems from other BOS-supported computers by direct transfer of 5¼-inch diskettes, or by using the REMOTE communications feature of *MBOS/5* via the serial port of the XT.

The *MBOS/5* operating system can support up to 99 terminals, although only two may be linked directly to a user's system. Also built into *MBOS/5* is print-spooling software, and the MicroCobol programming language.

(List Price: $1,050)

Requires: 128K, one disk drive, hard disk, serial port.

BOS International, Inc.
2560 Royal Ln.
Dallas, TX 75229
(214) 484-2717
Telex: 46 6475

CIRCLE 770 ON READER SERVICE CARD

InfoPost

An electronics mail communications program, permitting the user to transmit mail over the U.S. Postal Service's Electronic Mail (E-COM) system. Through the E-COM system, a user may transmit a letter with a mailing list of at least 200 people to the nearest serving post office, where E-COM will print the letter, insert the letters in window envelopes, and send them out via first class mail.

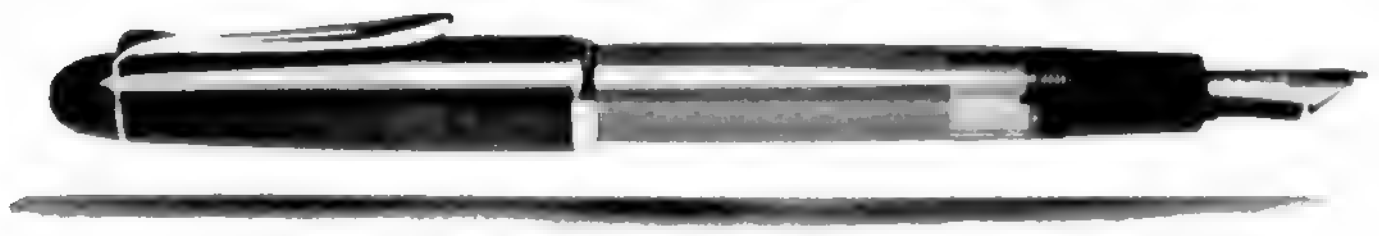
(List Price: $295.95)

Requires: 128K, one disk drive, PC-DOS or CP/M-86, async card, modem.

Info Designs, Inc.
6905 Telegraph Rd.
Birmingham, MI 48010
(800) 445-INFO
(313) 540-4010

CIRCLE 755 ON READER SERVICE CARD

BUSINESS LETTERS TO GO.



*OR, HOW TO WRITE EFFECTIVE BUSINESS LETTERS WITHOUT REALLY WRITING.

Often, when it comes to business letter writing, it's difficult to find the time. Or even the right words.

Add the routine business letters you should write during each busy day, and writing becomes an endless chore.

Even if you use a personal computer.

So you end up *not* writing all the letters you should. Or working overtime just to catch up.

Now there's help.

BUSINESS LETTERS AT YOUR FINGERTIPS.

With The Business Letter Library™, you get hundreds of concise, unique business letters, on disk. Superbly written by a leading business communications expert.

They're ready to go. And ready to use with your personal computer and almost any popular word processing software.

All *you* have to do is select the letter you need; customize, print, and mail. To clients, customers, business associates, vendors; *anyone* you do business with.

You get letters to start a business deal. Set up a meeting. Make a point. Close a sale. And *more*.

BUSINESS LETTERS WHEN YOU NEED THEM. FAST.

The LetterSearch™ feature of The Business Letter Library helps you quickly locate the type of business letter you need.

For routine correspondence, you can make quick changes to any letter from The Business Letter Library.

Or use the on-screen KeyStyle™ mode to write a custom, highly personalized version of each letter.

Either way, The Business Letter Library can help you write effective business letters to fit almost any business situation.

YOU'RE DONE!

By the time you've read this ad, you could've written a great business letter. It's really that easy.

And it's really that good: Whether you need to write many routine letters, or that single, very important one, you'll get *results*.

So turn business letter writing into a quick, easy, productive part of your day with The Business Letter Library.

For a full demonstration of The Business Letter Library, see your Dealer. Or call us at **(714) 642-1827.**

The Business Letter Library™

The Business Letter Library can be used with the IBM Personal Computer, Apple II or IIe, DEC Rainbow, Commodore 64 and many other microcomputers. Compatible with most popular word processing software packages.

Suggested Retail: $99.95.

Delta Point®

711 West 17th Street, Unit B10, Costa Mesa, CA 92627
(714) 642-1827

Look for future products in the Letter Library Series to meet your business, professional, and your social letter-writing needs.

LetterSearch, KeyStyle, The Business Letter Library and The Letter Library Series are trademarks of the Delta Point Corporation.™ Apple Computer, Inc.
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CIRCLE 187 ON READER SERVICE CARD

STEAM

A program to aid engineers involved with designing steam systems. *STEAM* finds pressure drops in piping systems, calculates flashing in multiple inlet flash tanks, and can determine flow requirements for desuperheating stations. The program features a design simplifying such case studies as require internal correlations of thermodynamic properties.

(List Price: $39.50)

Requires: 64K, one disk drive, PC-DOS.

Techdata
6615 la Mora
Houston, TX 77083
(713) 498-0797

CIRCLE 760 ON READER SERVICE CARD

Stock and Option Profit Graph

An investment data management template for Lotus' *1-2-3* spreadsheet program. The *Stock and Option Profit Graph* program calculates the value of a position in a stock and/or options on a stock, based upon price variations and the time elapsed since entering the position. The program allows the time values of cash borrowed or invested to be taken into account, and least-squares polynomial fit techniques are used to perform computations on the values of an option.

The template's output can be obtained in numerical form, or graphical form as profit graphs.

(List Price: $125)

Requires: 256K, two 320K disk drives, PC-DOS, Lotus' *1-2-3*.

Ohlsen Financial Mgmt. Corp.
132 Longview Dr.
Los Alamos, NM 87544
(505) 672-1472

CIRCLE 764 ON READER SERVICE CARD

Periodic Deposit Illustrator

A client finance program, capable of delivering a printout showing an initial deposit as well as periodic deposits to an investment account, at any rate of interest for any length of time, in a year-by-year format. The printout includes advisor and client names, rate of interest, type of asset, amount and frequency of periodic deposits, cumulative amount invested, and cumulative earnings. The whole program is shown on screen before printout.

Requires: 64K, one disk drive, PC-DOS, 80-col. printer.

(List Price: $19.95)
ACS Publishing Co.
P.O. Box 82363
San Diego, CA 92138
(619) 223-5331

CIRCLE 769 ON READER SERVICE CARD

G. FORM

A text formatting program for users' systems equipped with Epson MX-80 printers. The software can reformat text at word boundaries from a source file with different length lines, in response to prompts the user has answered or according to commands embedded in the text file. *G. FORM* also supports variable margins, line centering, underlining, pagination, different line spacings, variable print styles, and two column printing.

For Epson MX-80 printers with the Graftrax option, *G. FORM* also permits a graphics letterhead printing option.

(List Price: $19.95)

Requires: 64K, one disk drive, PC-DOS, Epson MX-80 printer.

Geoplot Computer Projects
P.O. Box 46173
Station G
Vancouver, B.C. V6R 4G5
(604) 731-7097

CIRCLE 765 ON READER SERVICE CARD

MITE/86

A communications program for use under the CP/M-86 operating system. The software permits communications with commercial databases such as CompuServe, The Source, Dow Jones, and networks such as TWX. *MITE/86* is menu-driven, and features full user control of all communications parameters (baud rate, parity, etc.). Various user-selectable options allow *MITE/86* to capture text from, or send data to, virtually any asynchronous/ASCII online system.

Features offered by the *MITE/86* program include macros, permitting up to ten strings to be assigned by the user to selected keys; a set of CCP-like functions (DIR, ERA, etc.), and support for three binary file protocols (XMODEM, CLINK/CROSSTALK, and HAYES).

(List Price: $195)

Requires: 64K, one disk drive, CP/M-86.

Mycroft Labs, Inc.
2639 Monroe St., #B-188
Tallahassee, FL 32314
(904) 385-1141

CIRCLE 763 ON READER SERVICE CARD

CHRISTMAS LIST

A personal mailing program that prepares, maintains, and prints a database of labels, tags, 3 × 5 cards, or any similar groups of data. The database portion of the program allows up to 3,000 labels per file, and files are supported for floppy disks, fixed disks, and RAM disks. A file re-formatting utility is provided which allows files to be modified to meet future data format needs without re-entering data.

Data files are maintained in an updated status so that unexpected program termination will not cause damage to data. Space allocated to deleted records is re-used for new records. Sorting is performed on a title field, displayed on-screen.
(List Price: $30)
Requires: 128K, one disk drive, PC-DOS, 80-col. monitor, parallel printer.
Johnson Software Co.
420 Pier Ave., $195
Hermosa Beach, CA 90254
(213) 374-6181

CIRCLE 776 ON READER SERVICE CARD

Buysel

A program for performing stock, commodities, and options analysis. The software incorporates four trading methods: Moving Averages, Price Channels, Buy Low/Sell High, and Dollar Cost Buying, to produce explicit buy/sell signals. Also used by the *Buysel* program is the Black-Scholes call option method for modeling common stocks over any time period.

Other *Buysel* features include statistical correlation computations between several stocks or commodities; automatically scaled closing price charts displayable on-screen; and price data entry and validation on a daily basis, or quick approximation of long periods of real price data. The software can generate price data for a stock, option, or commodity in any of three different manners.
(List Price: $149.95)
Requires: 64K, one disk drive, PC-DOS, BASICA.
Software City
P.O. Box 11082, Sta. H
Nepean, Ont. K2H 7T8, Canada
(613) 225-1305

CIRCLE 758 ON READER SERVICE CARD

Select Bilingual

A word processing program that includes both Spanish and English menus, help screens, and commands. Documents can be generated in either or both languages, while communicating with the software in the user's native language. User-expandable dictionaries of 10,000 words in both languages are included, as is a Spanish/English version of the *SuperSpell* spelling checker.

Select Bilingual contains on-screen interactive tutorials in both languages. The program can accommodate special Spanish punctuation characters such as tildes, inverted question and exclamation marks, accents, etc. Special characters are displayed on screen, making use of the complete IBM character set.
(List Price: $395)
Requires: 128K, two disk drives, PC DOS.
Select Information Systems
919 Sir Francis Drake Blvd.
Kentfield, CA 94904
(415) 459-4003

CIRCLE 775 ON READER SERVICE CARD

1983 Tax Templates

Software providing users of the Lotus *1-2-3* or *VisiCalc* spreadsheet programs with templates for preparing federal income returns. The *1983 Tax Templates* program permits the user to enter names, dates, and amounts into on-screen forms in the same manner as such data would be entered on the IRS paper forms. The software performs all required computations, determines the user's filing status, and calculates refunds or appropriate taxes due using IRS tax tables.

Schedules produced by the *1983 Tax Templates* include A through G, R, RP, and SE. Forms produced are 1040, 2106, 2119, 2210, 2441, 3468, 3903, 4562, 4625, 4972, 5695, 6251, and 6152.
(List Price: $89.95)
Requires: 128K, one disk drive, PC-DOS, *VisiCalc* or Lotus' *1-2-3 release 1A*.
Omega Microware, Inc.
222 S. Riverside Plz.
Chicago, IL 60606
(312) 648-4844

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Two versions of the *ACCS* package are available, for the PC and the PC/XT. The PC version can handle up to 1,000 active clients. The PC/XT can accommodate 12,000 client records.
(List Price: $3,300)
Requires: 256K, two disk drives, PC-DOS 2.0.
Computer Projections
36 W. 35th St., #5A
New York, NY 10001
(212) 239-0145

CIRCLE 768 ON READER SERVICE CARD

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ACCESSORIES

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An interactive videodisc system designed for retail computer businesses, enabling computer retailers to offer customers a higher level of support, before and after sales. Composed of a videodisc player, computer terminal, and a library of video presentations and training sessions, the computer terminal puts the videodisc player under program control with a user-friendly keyboard, allowing the user to branch to desired information within seconds. Portability of the system enables the customer to use the training program either in the store or in the customer's home or office.

The system can also be used for product demonstrations. Professionally prepared 3- to 6-minute video demonstrations are available on a wide range of microcomputer products.

(List Price: $2,695; training packages $340)
Digital Controls Inc.
5555 Oakbrook Pkwy.
Atlanta, GA 30093
(404) 441-3332

CIRCLE 783 ON READER SERVICE CARD



***The Learning Center**, Digital Controls Inc.*

Microcomputer Desk

A desk designed to accommodate a microcomputer. The table is at typing height, has a 30×30 inch surface, and a 30×10 inch riser. The unit has a bookcase base for convenient storage. There are two optional features; a disk drive rack for micros with detached disk drives and a storage module to provide additional space.

(List Price: $299)
Valley Craft
South Hwy. 61
Lake City, MN 55041
(612) 345-3386

CIRCLE 785 ON READER SERVICE CARD

Data Spec Adapters

Two adapters for converting serial RS-232 cable terminals. The ARS232AM adapter converts a 25 pin RS-232 "female" connector to a "male" type connector. The ARS232AF converts a "male" connector to a "female" connector. These adapters are shielded to standards that exceed FCC requirements, and incorporate a special PVC molding for maximum integrity and durability under adverse conditions. All 25 pins are connected, making the adapters virtually compatible with all serial line equipment.

(List Price: $19.95)
ORA Electronics
18215 Parthenia St.
Northridge, CA 91325
(213) 701-5848

CIRCLE 777 ON READER SERVICE CARD

Data Prompt

A device placed under a computer screen that displays data sheets one line at a time for easy reading. The unit is easily installed and adapts to any computer station. The reference line shown is adjustable, and a front window flips open for loading. Long data sheets extend out the rear of the unit, leaving the workstation free of paper clutter. The unit comes in two models to accommodate both 11- and 15-inch paper.

(List Price: DP-11, $69.95; DP-15, $79.95)
Close Enterprises
P.O. Box 13903
Arlington, TX 76013
(817) 429-3006

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W.S.T. (formerly SIEMENS)

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CIRCLE 218 ON READER SERVICE CARD

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(List Price: $5.95)
Micro Logic Corp.
P.O. Box 174
Hackensack, NJ 07602
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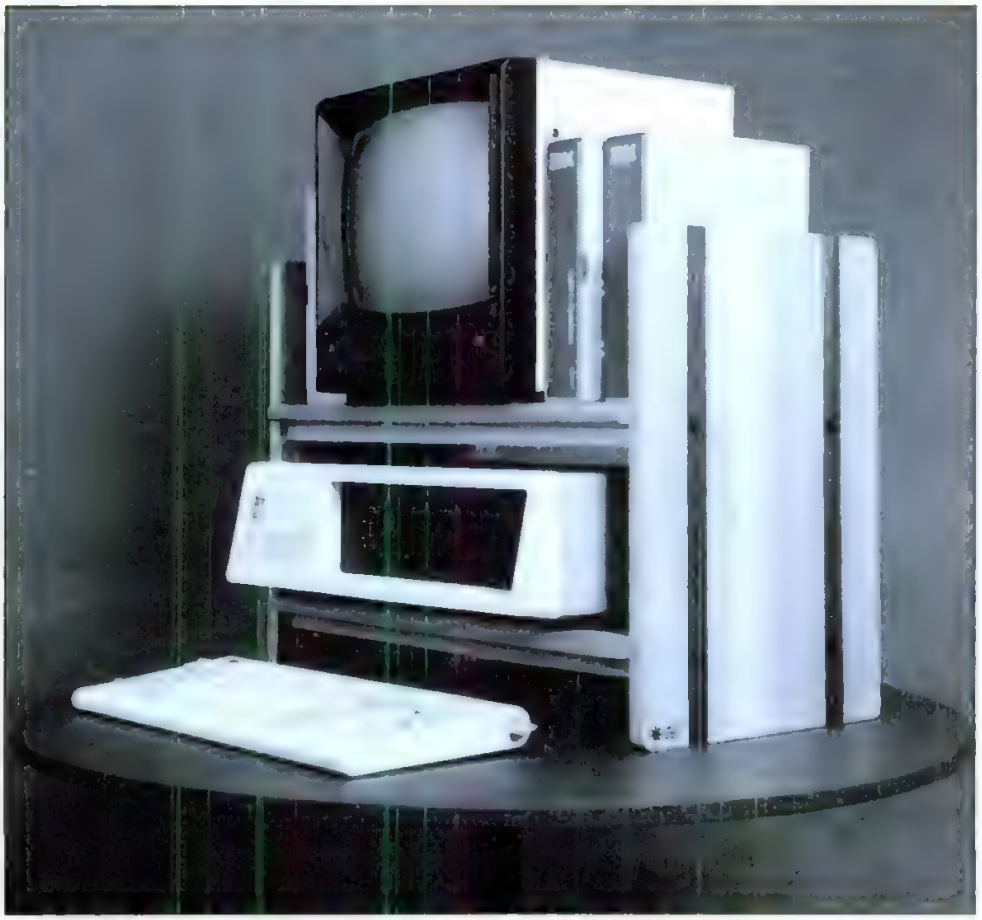
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California Design Works
Box 3052
Monterey, CA 93940
(408) 394-5005

CIRCLE 781 ON READER SERVICE CARD



*Stack*Rack, California Design Works*

END STAT

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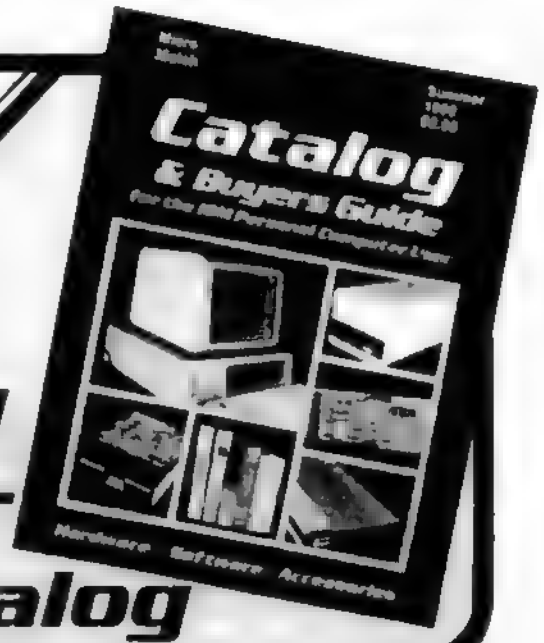
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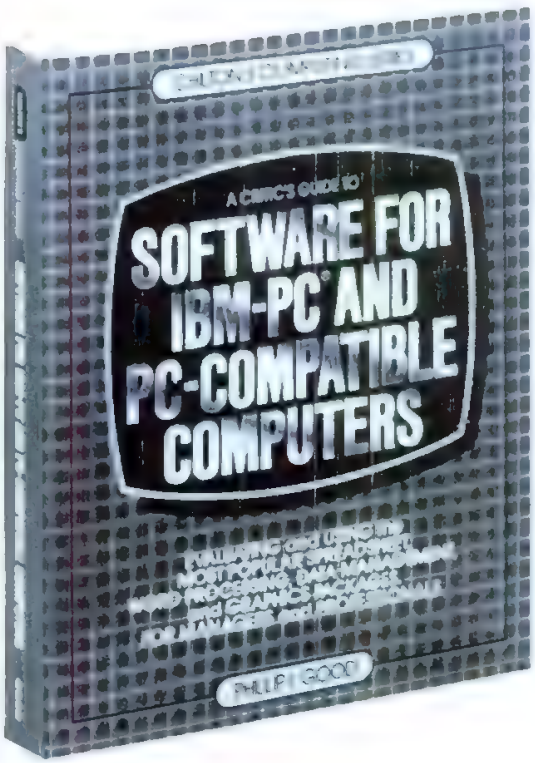
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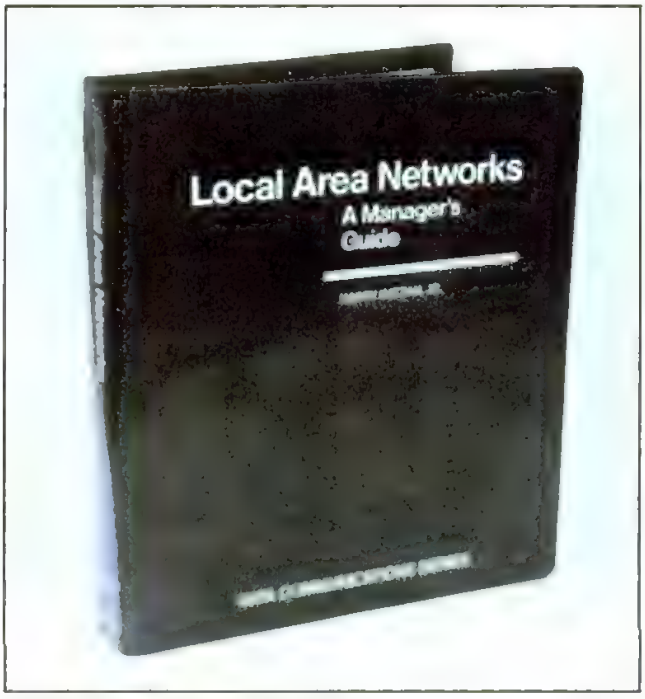
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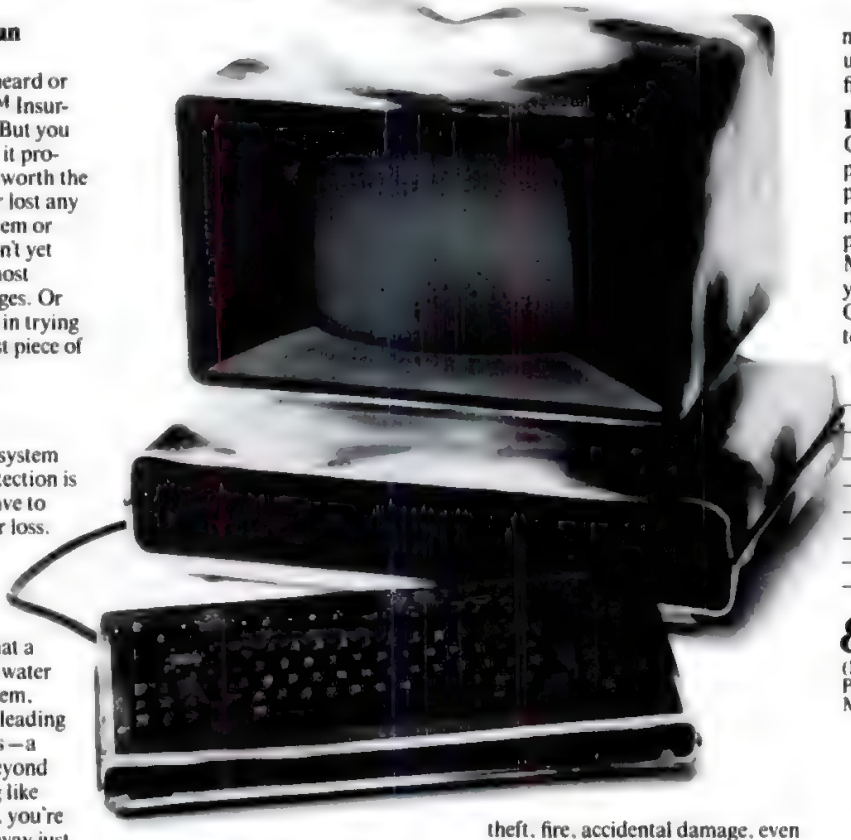
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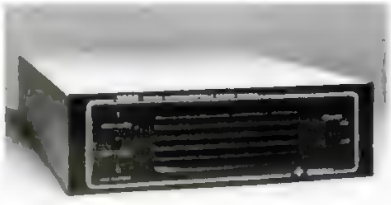
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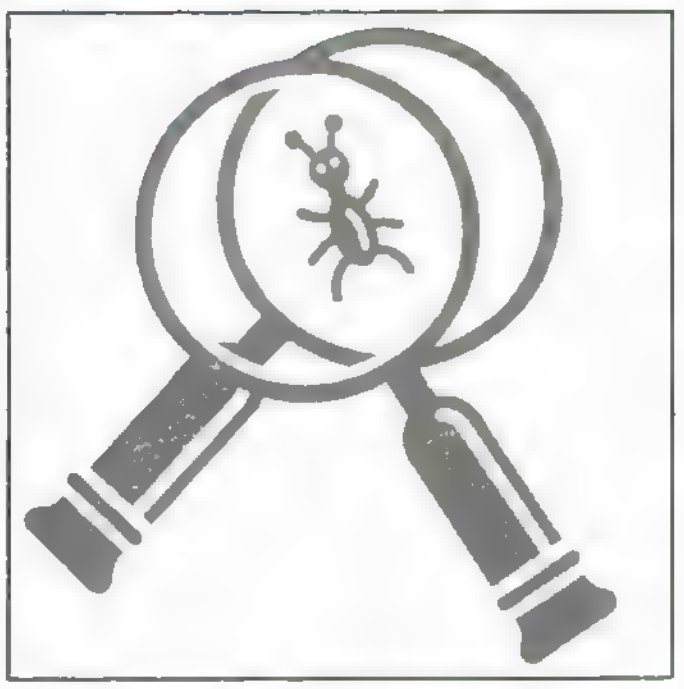
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CIRCLE 368 ON READER SERVICE CARD

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User-to-User

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String Speed-up

The benchmarks in Figure 1, run under version 2.0 of BASICA, suggest a way to speed up string manipulations.

The first routine uses a regular assignment (LET) statement, in line 150, while the second uses an LSET statement, which is a good deal faster.

But what if B$ is shorter than A$? LET only moves the contents of B$, whereas LSET also pads the remainder of A$ with spaces. LSET does more work, but it can still be faster than LET as the tests in Figures 2 and 3 show. The margin is narrower but still significant!

To take advantage of the speed of LSET under BASIC 2.0 you must:

1. Define the strings that are to be changed by LSET, at the beginning of the program. Each string should be defined as a number of spaces equal to the maximum length you expect for that string.

2. Then, in the rest of the program, be careful not to specify these same strings as destinations in LET statements or sequential INPUT statements (keyboard or disk). Use LSET to set the value of the entire string and the MID$ function (e.g., MID$(A$,5,10) = B$) to modify a part of a string. Because MID$ is a lot slower than LSET, you should not use it to change the whole string.

We need these rules because LSET (and also the MID$ function) always

```
100 REM   Pirko/1
110 A$=SPACE$(120)
120 B$=STRING$(120,"A")
130 T1=TIMER
140 FOR IX=1 TO 10000
150 A$=B$
160 NEXT
170 T2=TIMER
180 PRINT "Time = ";T2-T1
```

```
100 REM   Pirko/2
110 A$=SPACE$(120)
120 B$=STRING$(120,"A")
130 T1=TIMER
140 FOR IX=1 TO 10000
150 LSET A$=B$
160 NEXT
170 T2=TIMER
180 PRINT "Time = ";T2-T1
```

Figure 1: *String manipulation benchmarks #1 (left) and #2.*

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USER-TO-USER

maintains the length of the string at its previous value. If you alter the string any other way, its length will be reset to that of the source string, which, if short, will cause subsequent LSETs with longer strings to truncate them.

This technique will help programs that do string manipulation in memory (e.g., sorting). It may also aid programs that use random files. Such programs would already be using LSET to move data to the variables in the FIELD statement, and I suggest using it for string movement in the opposite direction also.

The gain in speed might be greater than the benchmarks suggest because this approach can eliminate the dreaded garbage collection blues. When LSET is used to assign a value to a string variable, the new string is moved to the memory location already occupied by the previous contents of the string variable. Because the location of the string variable doesn't change, no garbage (i.e., memory space containing previous versions of the string) is created. Therefore, there is no garbage to be collected.

Why is LSET faster than LET even when garbage collection is not a major factor? I ran BASICA under DEBUG and found that LET executes a slow routine in the BASIC ROM (my contribution to *Dr. Dobb's* clinic in March 1983 discusses this in more detail). LSET uses a better routine, in BASICA, that takes advantage of the 8088 string-move instruction.

To summarize, anyone doing extensive string manipulations under BASIC 2.0 (or even under BASIC 1.0 if garbage collection is a problem) might well consider using LSET. The tradeoff is between a possible gain in efficiency versus the greater programmer effort required.

Robert Pirko
New York, NY

Good point. I wonder how many other undocumented optimizations are out there, especially because under BASIC there are usually several ways to handle a task. Anyone out there know of any?

```
100 REM   Pirko/3
110 A$=SPACE$(120)
120 B$=STRING$(60,"A")
130 T1=TIMER
140 FOR I%=1 TO 10000
150 A$=B$
160 NEXT
170 T2=TIMER
180 PRINT "Time = ";T2-T1
```

Figure 2: *String manipulation benchmark.*

```
100 REM   Pirko/4
110 A$=SPACE$(120)
120 B$=STRING$(60,"A")
130 T1=TIMER
140 FOR I%=1 TO 10000
150 LSET A$=B$
160 NEXT
170 T2=TIMER
180 PRINT "Time = ";T2-T1
```

Figure 3: *String manipulation benchmark.*

Lister Fixer

BASIC programs that have statements longer than 80 characters are hard to read. Many people prefer that "continuation lines" in a listing be indented to make the line number stand out. By "continuation line," I mean the parts of a long statement that "wrap around" to the next lines on the page or screen.

Going through an already written program and editing all long statements to insert spaces to do this is tedious. The attached program, EDITBAS.BAS (see Figure 4), will do the job automatically, and runs very fast when compiled.

The program will *never* break a statement inside a quoted string and won't put extra blanks inside a number. It automatically determines the column position of the first character in the statement and will place all subsequent continuation lines beneath this character.

Jim Glass
Sherman Oaks, CA

A useful program. With some minor tweaking, it could perform its magic on 40-width screens. If you're writing a graphics program and are accustomed to using the 80-width screen, the mess you get when you run your program and then list on the 40-width screen can be annoying, and the output from this program

```
1 REM EDITBAS.BAS by Jim Glass
2 REM COPYRIGHT 1984
3 REM This progras is in the public domain and may be freely copied and
4 REM distributed, so long as it is not sold for profit.
5 REM
6 REM EDITBAS will reformat a BASIC progras which has been stored in ASCII.
7 REM It will break up lines longer than 80 characters and indent the 2nd
8 REM and following lines to line up with the first character of the statement.
9 REM
10 DEFINT A-Z
20 DIM MAP(256)
30 FOR I=1 TO 256:MAP(I)=-1:NEXT
40 FOR I=48 TO 57:MAP(I)=0:NEXT:FOR I=65 TO 90:MAP(I)=0:MAP(I+32)=0:NEXT
50 MAP(13)=0:MAP(35)=0:MAP(38)=0:MAP(46)=0:MAP(33)=0:MAP(37)=0:MAP(34)=0
60 TRUE=-1:FALSE=0
70 CLS
80 PRINT
90 PRINT"Enter name of source Basic progras: ";
100 INPUT F$
110 IF MID$(F$,LEN(F$)-3,1)="." THEN 140
120 PRINT CHR$(34)".BAS";CHR$(34);" EXTENSION ASSUMED FOR SOURCE..."
130 F$=F$+".bas"
140 PRINT:PRINT "Enter name of output file: ";
150 INPUT G$
160 PRINT
170 OPEN F$ FOR INPUT AS 1
180 OPEN G$ FOR OUTPUT AS 2
190 CR$=CHR$(13):LF$=CHR$(10):QUOTE$=CHR$(34)
200 K=1:L=0:Z$="":J=0
210 STRNG=FALSE
220 WHILE NOT EOF(1)
230 G$=INPUT$(1,#1):IF G$=" " AND J=0 THEN J=-1:S=K
240 IF G$=QUOTE$ AND NOT STRNG THEN STRNG=TRUE ELSE IF G$=QUOTE$ THEN STRNG=FALSE
250 K=K+1:Z$=Z$+G$:IF G$=LF$ THEN 390
260 REM
270 IF K MOD 80 <>0 OR G$=CR$ THEN 220
280 N99=N99+1
290 FOR N=LEN(Z$) TO 1 STEP -1
300 R$=MID$(Z$,N,1):R=ASC(R$):IF R=34 THEN STRNG=NOT STRNG
310 P=N
320 IF MAP(R) AND NOT STRNG THEN 350
330 NEXT
340 STOP
350 REM found breakpoint
360 S$=STRING$(S+(N99*80-P)," ")
370 Z$=LEFT$(Z$,P)+S$+MID$(Z$,P+1):K=S+N99*80-P
380 GOTO 220
390 L=L+1
400 R$=MID$(Z$,1,LEN(Z$)-1)
410 K=1:PRINT#2,Z$:PRINT R$;:Z$="":S=1:J=0:N99=0
420 STRNG=FALSE
430 WEND
440 PRINT:PRINT"Total lines: ";L
450 PRINT"Progras ";F$;" has been edited and placed in file ";G$
460 END
```

Figure 4: *EDITBAS program to spruce up program listings.*

would be a dramatic improvement. One thing—if you're going to use EDITBAS, do remember to run it through the BASIC compiler. It runs awfully slow otherwise.

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Furthermore, all programs that create .COM or BSAVE'd executable code from decimal or hex data must be accompanied by the source code in assembly language. This, too, will reduce errors and will be instructive to readers of User-to-User. ■

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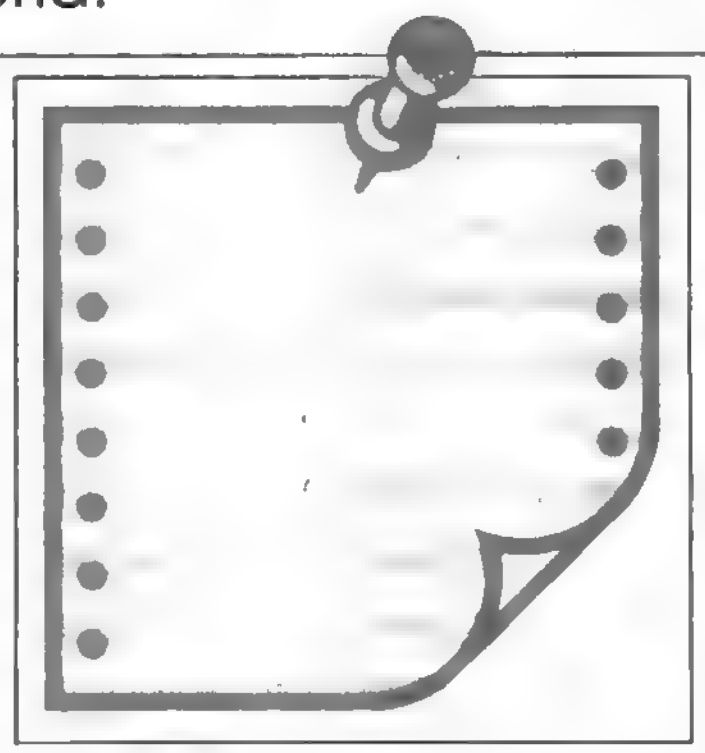
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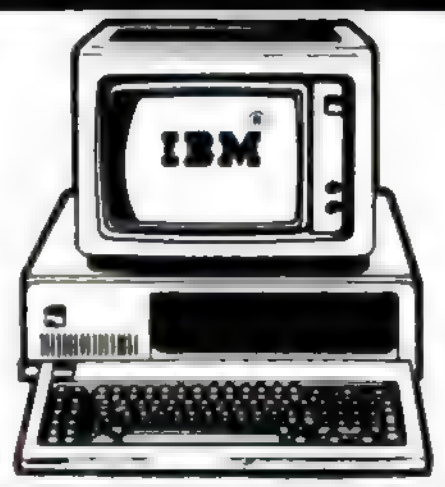
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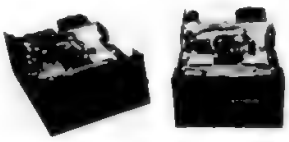
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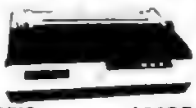
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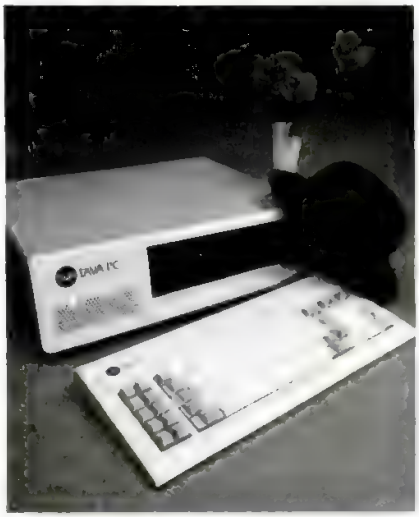
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A Desire to Delete

Q: I would like to know how to delete a record out of a random file. For example, in a random file with six records, how can I delete the third record? How can I do the same thing with a sequential file?

Charlie Trotter
Monmouth, Oregon

A: *The same technique is used for both types of files, although details in the code for the routines may differ. The technique involves making a duplicate of the file, but without the records you wanted to delete.*

If you want to use this method where the deleted records are physically removed in the course of copying the new version of the file, try using a routine like the program listed in Figure 1. As written here, the program assumes that each record has a length of NLEN characters and that the file is named MFILE.

The only other way to delete a record is to define a label that will identify a record as deleted. For example, putting the word "DELETED" in a record's Name field can tell a program that this record should be treated as if it were deleted. This type of deletion system is quicker and easier to use than one that has the program rewrite the file each time you want to delete a record. The trade-off is that any program that reads the file must check for deleted record labels every time the file is read. If you use labels to put unwanted records out of circulation, you should also have an append procedure that will recycle memory space by overwriting deleted records with new entries wherever possible.

Okidata Graphics Dumps

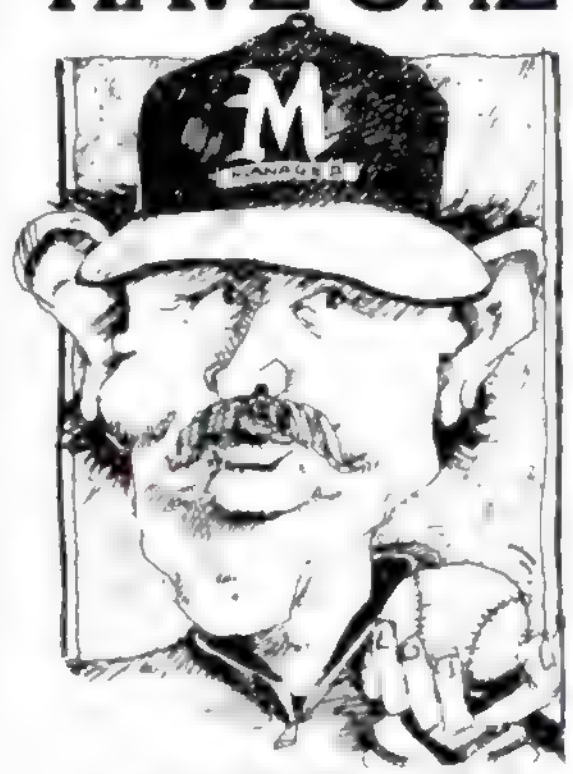
Q: I have an Okidata 92 printer that I use with my IBM PC. Is there some routine that will patch the GRAPHICS.COM program in PC-DOS 2.0 so it will allow screen dumps to my printer? If a patch isn't available, can you suggest a short BASIC or assembly language program that will do the job?

Mike Ansnes
Saratoga, California

A: *Sorry, but it would be next to impossible to patch the program since the Okidata printer is so different from the Epson printers that GRAPHICS.COM is designed for.*

Okidata offers a solution in the form of a set of ROM chips, sold under the name Plug 'N Play. When these chips are put in place of those that are already in your printer, the Okidata will respond like an Epson printer. (Plug 'N Play was

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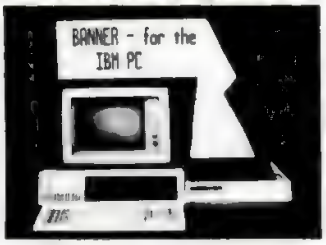
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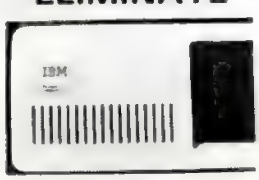
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PC TUTOR

```
5    REM  Routine to delete one record
10   NLEN = 100   :  REM   Record length
20   INPUT "Enter Record # to Delete: "iMYDEL
25   REM  MYFILE is the original file
30   OPEN  R",#1, MFILE",100
40   FIELD #1,100 AS B$
45   REM  MCOPY should be a new file
50   OPEN "r",#2, MCOPY",100
60   FIELD #2,100 AS C$
65   REM  Calculate file length (in records)
70   FLEN = INT(LOF(1)/NLEN)  :  J=1
75   REM  Begin main read/write loop
80   FOR I=1 TO FLEN
90      IF I=MYDEL  GOTO 140
100     GET #1,I
110     LSET C$=B$
120     PUT #2,J
130     J=J+1
140  NEXT I
145  REM  Now replace files
150  KILL "MYFILE"
155  REM  Use KILL command with caution
160  NAME "MCOPY" AS "MYFILE"
170  END
```

Figure 1: *A BASIC routine that deletes a record from a random file.*

reviewed in "Interfacing With Okidata," PC, Volume 2 Number 5.)

Also, there are programs designed to print graphics screens with the Okidata printer, which you could run instead of GRAPHICS.COM. The software is cost competitive with the Plug 'N Play set, and this approach would let you take advantage of some desirable features of the Okidata printers that the Epsons don't provide.

EasyWriter Meets Prowriter

Q: I have an IBM PC and an NEC Prowriter printer. A great deal of software is configured for the Epson printer. Some programs allow a user to reconfigure the software to fit the printer's specifications.

Such is the case with *EasyWriter II*. On its Housekeeping Diskette, option #7 allows a user to change the printer selection from its standard setting to either Custom Printer A or Custom Printer B. If B is selected, the program will use preset values for printer control that are tailored to an Epson printer.

When I try to reconfigure the settings in B for using the Prowriter, the program gives me four pages of forms to fill in. What values should I enter at this stage to get my Prowriter to work with *EasyWriter II*? Or will this program work at all with my printer?

Clay Moore
Reynoldsburg, Ohio

A: *Yes,* EasyWriter II *can be used with the NEC Prowriter I. When you fill out the forms on the screen, you should begin by setting the most used functions, such as underline and boldface. Later, you can enter values to set up some of the more exotic features. In Figure 2, I've listed a minimal set of values you need to enter on the forms. While you do this, refer to the section in the* EasyWriter *manual's appendix that describes Custom Printer B.*

Most word processing software for the IBM PC will support the NEC Prowriter in a similar manner. The programs let you choose the appropriate escape sequences that activate the Prowriter's features.

Bypassing a dBASE II Header

Q: I would like to access a *dBASE II* database file from within BASIC. My problem lies with the header of the database. At the beginning of each .DBF file created by *dBASE II*, there's a 400-byte header that contains information on the number of records and the type, name, and size of the fields. The actual data in the file, which follows this header, is in the standard format of a BASIC random access file.

I can't figure out how to skip over that 400-byte header from within BASIC without resorting to this sort of *dBASE II* instruction:

```
COPY TO <filename> SDF
```

or using a BASIC FIELD command that deals with many 1-byte fields, which skips the 400 bytes of the header and concatenates the 1-byte fields together again. Is there an easier way?

Gerald Belastock
Newton Highlands, Massachusetts

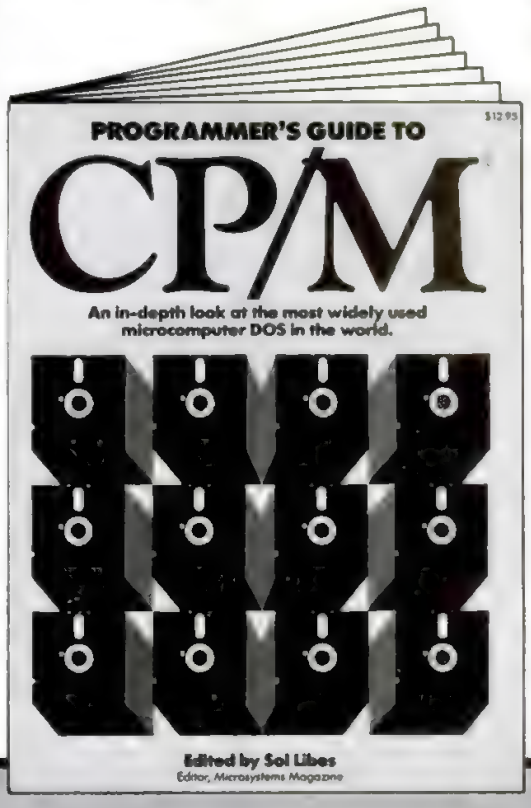
A: *There's one approach, other than the two you mentioned, that may be useful. If the records in your file are nearly 100 bytes in length, you could pad the character fields of all the records to a length of exactly 100 bytes, then pass up the 400-byte header by having your program skip over the first four 100-byte records. (This method would also work with records of*

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426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450
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626 627 628 629 630 631 632 633 634 635 636 637 638 639 640 641 642 643 644 645 646 647 648 659 650
651 652 653 654 655 656 657 658 659 660 661 662 663 664 665 666 667 668 669 670 671 672 673 674 675
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701 702 703 704 705 706 707 708 709 710 711 712 713 714 715 716 717 718 719 720 721 722 723 724 725
726 727 728 729 730 731 732 733 734 735 736 737 738 739 740 741 742 743 744 745 746 747 748 749 750
751 752 753 754 755 756 757 758 759 760 761 762 763 764 765 766 767 768 769 770 771 772 773 774 775
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801 802 803 804 805 806 807 808 809 810 811 812 813 814 815 816 817 818 819 820 821 822 823 824 825
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50 bytes or 200 bytes, or some other length that's a simple divisor of 400.)

The cost of using this approach is the additional memory taken up by the padding characters. Also, I wouldn't count on all .DBF files having a header of the same length.

Of the three methods, I'd prefer using the first, which involves a dBASE II *instruction. This would guarantee that your program would be compatible with later versions of* dBASE II. *If your program depends on the header being an exact length, your program's code may need fixing whenever Ashton-Tate updates its software.*

```
 4. Reset Printer
 5. Page Preset                          12
 6. Enter Page Preset
 7. To perform Backspace                  8
 8. At beginning of line
 9. End of line to advance               13 10
10. End of line no advance               13
11. Left Margin Set
12. Right Margin Set
13. Left Margin Release
14. Right Margin Release
15. Start Justification
16. Stop Justification

PITCH SETTINGS

17. [10 ]  [10 ]                        27 78
18. [12 ]  [12 ]                        27 69
19. [17 ]  [17 ]                        27 81
   (Lines 20 through 26 are blank)
25. Default Pitch                        10
26. Set Pitch on Every Line              N

LINE SPACING SETTINGS

27. [2  ] [2  ]                         27 84 55 50
28. [4  ] [4  ]                         27 84 51 51
31. [6  ] [6  ]                         27 65
32. [8  ] [8  ]                         27 66
33. [1. ] [1. ]                         27 84 49 50
34. [16 ] [16 ]                         27 84 48 57
   (Lines 35 through 48 are blank)
 2. Default Line Spacing                 6
 4. Set Line Spacing on Every Line       N

EDIT FONT SEQUENCE

51. Normal to Bold                       27 37
52. Bold to Normal                       27 34
53. Normal to Shadow                     27 33
54. Shadow to Normal                     27 34
55. Normal to Underline                  27 88
56. Underline to Shadow                  27 89
   (Lines 57 through 66 are blank)
```

Figure 2: *Values to fill in the Custom Printer B on-screen form in* EasyWriter II *that will make the program work with the NEC Prowriter I printer.*

RAMdisk Options

Q: You have written about RAMdisks frequently in your column. I think I know, by now, what a RAMdisk is and what it is used for. I have a copy of a RAMdisk program that was written in assembly language for the IBM PC, but it is designed specifically for PC-DOS 2.0, which I do not use.

I don't know assembly language well enough to adapt this program for PC-DOS 1.1. Can a RAMdisk program be written in the C language, or some other nonassembler language? If so, could you give me some hints on how to go about doing this? Or are there any commercially available RAMdisk programs that you would recommend?

Robert Tracy
West Haven, Connecticut

A: *It is not really feasible to write a RAMdisk program in anything but assembly language. The reason is that any compiled language gives too little control over the operating system. A RAMdisk is a very hardware-specific piece of software; most languages are too general purpose to create one. While you might find an implementation of C language that would allow you to write a RAMdisk program, you'd have to be very familiar with this language's tricks.*

I have examined three commercial RAMdisk programs for PC-DOS 1.1. Each of them worked only with a few PC-DOS programs, and all suffered from other defects. While you might be able to find one that would suit your applications, there isn't one I would recommend that would satisfy most users.

On the other hand, you seem to be overlooking an obvious solution. Why not just spend $60 and get a copy of PC-DOS 2.0? For your money you'd get a working RAMdisk program—the one you already have—and a much better operating system as well.

The PC Tutor solves practical problems and explains points of general interest. If you'd like to see your questions answered here, drop a line to PC Tutor, *PC Magazine*, One Park Avenue, New York, NY 10016.

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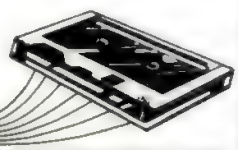
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141	The Bernoulli Box	I-Omega	188
316	Checkbook Plus	Microconcepts Inc.	468
427	ONX	Quantum Software Systems	362
*	P-System	Network Consulting	241
ACCOUNTING SOFTWARE			
497	Business Software Services	Spectrum Software	341
*	Desk Top Accountant	Rocky Mountain Software Systems	300
486	Mini Ledger	Paradigm Consultants	301
188	Real World Software	MBSI	5
801	Time Accountant	Time Accountant	287
260	Vera Business Series	H & E Computronic	470
INTEGRATED ACCOUNTING PACKAGES			
163	Business	Bristol Info Systems	347
191	d BASE II Accounting Software	Small Business Technology	409
COMMUNICATIONS SOFTWARE			
101	Apple-IBM Connection	AlphaSoftware	2
326	Crosstalk	Microstuf Inc.	267
182	The Odd Couple	Rogue River Software	276
107	Encyclopedia	Ashton-Tate	310
TERMINAL EMULATORS			
224	Emulator With Graphics	Microplot Systems	288
365	Smarterm PC	Persoft Inc.	260
123	V Term	Coefficient Systems	50
OTHER UTILITIES			
475	Zeno Copy	Vertex Systems	77
FINANCIAL PLANNING SOFTWARE			
178	Business Planning Tools	Sofstar	64
132	Encore	Perox Microsystems	299
241	Financier II	Financier	9
109	Micro MPS	The Boston Company	279
497	Personal Finance Master	Spectrum Software	341
831	Personal Finance Program	Best Programs	53
306	Sideways	Funk Software	377
185	Spread Sheet Link	Dow Jones Software	163

RS#	PRODUCT	ADVERTISER	PAGE#
GRAPHICS SOFTWARE			
221	Chartmaster	Decision Resources	65
189	Graphic Package	Science Management Corp.	330
281	Graphics Software	Micrografix	332
138	Graphics Family	Digital Research	66-67
238	Graph Plan	Chang Laboratories	112
217	Lite Pen	Lite Pen	298
223	Pyxel Visuals	Pyxel Visuals	311
PROJECT MANAGERS			
330	Management Diagnostic Training Series	Quala	326
424	Task Master	Thoughtware Inc.	344-345
ENGINEERS/SCIENTISTS			
540	CAD Plan	Personal CAD Systems	98-99
530	Engineering Software	Physical Sciences Inc.	460
219	Images 2-D	Celestial Software	320
REAL ESTATE			
301	Real Estate Investment	Good Software	332
STATISTICAL SOFTWARE			
122	Business Statistical Software	Lionheart Press	468
220	Microstat	Ecosoft, Inc.	444
402	Stat Pac	Walonick Associates	460
WORD PROCESSING SOFTWARE			
114	Bonnie Blue Word Processing	Bonnie Blue Software	63
380	L.E. Word Processing	Leading Edge	Cover 2
477	Multi Mate	Softword Systems Inc.	51
527	Palantin Software	Palantir Software	358
387	Readwriter	Readiware Systems	403
*	Textra	Ann Arbor Software	14
*	The Word	Micro Soft Inc.	108-109
WORD PROCESSORS			
187	The Letter Library	Delta Point Software	386
504	New Word	Rocky Mountain Software Systems	47
385	Volkswriter Deluxe	Lifetree Software	220
374	World Plus PC	Professional Software	21

PC PRODUCT INDEX

RS#	PRODUCT	ADVERTISER	PAGE#

WORD PROCESSING AIDS

184	Fancy Font	Softcraft Inc.	261
136	Gold Letters	Data Base Industries	356
392	Proofwriter	Image Processing Systems	293
253	Set-FX	Soft Style	312

MULTIFUNCTION SOFTWARE

113	Context MBA	Context Management	48
177	Doubledoss	Soft Logic Solutions	370
151 & 216	Financial Planning and Educational	MECA	236 & 239
153	Fridays	Ashton-Tate	450
124	Jack 2	Business Solutions	89
833	Mass Mailer	Alternative Software	29
348	Micro FCS	EPS Inc.	283
268	Multifunction Software	Friendly Soft Inc.	70
810	The Office Unix Systems	Unisource	38
352	Public Domain Software	PC Software Interest Group	401
470	Systemate	Systemate	308
501	Elan	Tecmar	170-171
*	PC.Jr. AddOn	Tecmar	C-3

DEMONSTRATION SOFTWARE

115	Learning Ware	Advanced Ideas	107
140	Psychology Software	Balis Computing, Inc.	340
279	Scripture Scanner	Omega Software	241

ENTERTAINMENT SOFTWARE

128	Psychotherapist	Artificial Intelligence Research	340

TRAINING SOFTWARE

529	The Instructor Professor DOS	Individual Software	20
116	Training	American Training International	17

HOME MANAGEMENT AIDS

*	Computer Chef	Software Toolworks	468
230	Couponomizer	Natural Software Ltd.	407
450	Microcookbook	Virtual Combinatics	250
112	Pronto Home Banking	Chemical Bank	96

LANGUAGES

*	Better Business Basic	Micro Soft Inc.	108-109

COMPILERS

*	Borland Compiler Turbo Pascal	Borland International	43
473	SSB Pascal	Software Bulding Blocks	410

INTERPRETERS

276	PC Forth	Laboratory Micro	410

OTHER LANGUAGES

198	Logo	Harvard Associates	365

RS#	PRODUCT	ADVERTISER	PAGE#

PROGRAMMER'S TOOLS

823	d Programmers	Sensible Designs	251
182	SPF/PC	Rogue River Software	276

DATABASE MANAGERS

160	Data Base Management Systems	GMS Systems	456
139	DataBase Manager II	Alpha Software	3
193	Data Ease	Software Solution	247
278	Data Path	Satellite Software International	10
157	d BASE	Ashton-Tate	157
192	DB Fabs	Computer Control	338
493	It's My Business	Quest Research	245
525	Knowledge Man	MDBS	114-115
129	Manager	Call Computer	429
248	"Oz Management Control"	Fox and Geller	26
106	Pro Base	Data Technology Industries	225
110	"Thor"	Fastware	45
271	TIMM	Innovative Software	274
210	XIM	Xanthe	361

PROGRAM DEVELOPER/GENERATOR TOOL

283	Animator	Micro Focus Inc.	217
125	Basic-C	C Source	284
443	Program Developer	RTCS	44
150	Tools	Blaise Computing	401

OTHER UTILITIES

340	Disk Mechanic	MLI Microsystems	460
369	File Transfer Program	Personal Computer Products	333
346	Power Utilities	Norton Utilities	378
133	Printer Driver	Connecticut Software	448
438	Prokey	Rose Soft	59
388	Realia Spacemaker	Realia Inc.	460

HARDWARE

289	Keytronic Keyboard	Keytronics	164
173	Portable Business Computer	Panasonic	74
211	XPC	XDS Marketing	342

IBM PC COMPATIBLE COMPUTERS

197	Commuter	Visual Computer	110-111
*	Compatible Computer	Compaq Computer Corp.	18-19
*	Computers	Scottsdale Systems	360
215	Corona PC	Corona Data Systems	54
269	IBM-PC	IBM (PC Division)	24-25
370	IBM PC Compatibles	Seequa	32
166	IBS Personal Computer	IBS Co.	286
375	TAVA Capitol Letters	TAVA	121

VIDEO/GRAPHICS BOARD

337	Chairman	Mylex	307
512	Graphics Display Boards	Persyst	158-159
164	Graphics Edge	Everex Systems, Inc.	233
430	Graphix Plus	STB Systems	Cover 3
261	Hercules Computer Technology	Hercules Computing Inc.	8
383	Multigraph	Profit Systems Inc.	223

PC PRODUCT INDEX

RS#	PRODUCT	ADVERTISER	PAGE#
OTHER ACCESSORY CARDS			
176	Disk Drive	Micro Design	354
484	Multi Display Card	Paradise Systems	351
EXPANSION UNITS			
142	Electronic Floppy Disk	Dilog PC Products	302-303
119	Expansion Module	Dessert Technologies	364
168	Memory Expansion Kits	James Electronics	468
126	PC Plus	Data Storage Solutions	368
INPUT HARDWARE			
250	Light Pen	FTG Data Systems	44
436	Magnetic Stripe Reader	TPS Electronics	410
INTERFACE DEVICES			
127	Bytewriter	Bytewriter	286
206	Microfazer	Quadram	22
MASS STORAGE HARDWARE			
105	AM DISK-V	AMDEK	68
159	Bubble Memory Board	Helix Laboratories	11
445	Cartridge Tape/Hard File System	Tallgrass Technologies	27
104	Disk Back-up System	ACI Computers	246
474	Disk Drive and Tape Backup	Sysgen	440
218	Disk Drive Subsystem	Floppy Disk Services Inc.	392
401	Hard Disk Kits	Sigma Designs	329
*	IDEAdisk	IDEAssociates	178
194	PC Stor	Alloy	231
313	Pegasus	Great Lakes Computer Peripherals	381
437	Starburst Winchester Drive	Maynard Electronics	315
382	Tape Subsystem	IBEX Computer Co.	444
MODEM			
460	Access 1-2-3	Novation Inc.	318
227	PC 212A/1200 Modem Card	Qubie Distributing Co.	462-463
469	PC Modem Half Card	Ven-Tel	88
400	Pro Modem 1200	Prometheus	103
303	Smart Modem	Hayes Microcomputer Product	336-337
803	Transcend PC	Transcend PC	290
NETWORKING			
*	PC Net	Santa Clara Systems	212-213
OTHER COMMUNICATIONS HARDWARE			
444	Irma and Irmaline	Digital Communications Association	30-31
DISPLAYS/MONITORS			
447	Anti-Glare Screen	Screen Data Corporation	4
299	Monitor	Princeton Graphics Systems	202
PRINTERS			
*	Juki 6100 Printer	PC Annex/PC Brand	104-105
396	Printer	Star Micronics	219
155	Printers	The Bottom Line	72-73
203	Quadjet	Quadram	12-13
DAISY WHEEL			
127	Daisy Wheel Printer	Bytewriter	286
PLOTTERS, ETC.			
308	Plotter	Houston Instruments	242
VOICE SYNTHESIZERS/SOUND RELATED HARDWARE			
824	Video C-77	Rapitech Systems	369
FURNITURE			
199	Computer Furniture	Compucart	28
134	Daisy Net System	Daisy Net International	346
*	Furniture	Lawrence Woodwork	325
265	Furniture	Microcentre	316
186	Work Station	Simonton Industries	306
DISKETTE			
205	Computer Diskettes	Creativity Unlimited	411
179	Diskettes	The Diskette Connection	444
145	Diskettes	Disk World	356
ACCESSORIES			
272	Accessories	Microcomputer Accessories	339
KEYBOARD OVERLAYS			
441	Keyboard Template	Systems Management Corp.	132
OTHER SUPPLIES			
304	A and B Switches	PMI Micro Wholesalers	378
318	Computer Accessories	Digital Supply Company	23
832	Computer Supplies	Elek-Tek	299
148	Condensed Air Spray	Falcon	289
196	Dust Covers	Contemporary Computerware	444
202	Kleentex Template	Creative Computer Products	352
217	Lite Pen	Lite Pen	298
368	Micro UPS	Gould	400
270	PC Protector	INMAC	467
143-144	PC Saver Microsaver	Kensington Microware	324-325
167	Printer Switch	Intra Computer	365
171	Remote Control	Kensington Microware	313
LITERATURE			
170	Books	John Wiley and Sons Inc.	354
536	Books	R.J. Brady Co.	36-37
806	IBM Literature	Reston Publishing	447
515	Periodicals	Data Sources	319
476	Software Directory	Westico	340
ORGANIZATIONS AND SERVICES			
131	Computer Information Network	Compuserve Info Service	100
*	Computer Insurance	Safeware	399

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Driving with ANSI.SYS

This first of a two-part series describes a loadable device driver for DOS 2.0 that gives you expanded control over such peripherals as the keyboard, cursor, and screen display.

A program in DOS 2.0 called ANSI.SYS will give users of the IBM PC extended control over keyboard and display functions—provided you can figure out how to use it.

ANSI.SYS is a loadable device driver that becomes part of DOS and remains in memory with COMMAND.COM. Loadable drivers are a feature of DOS added with version 2.0 (see "The Dark Side Of PC-DOS 2.0," *PC*, Volume 2 Number 2). They allow you to change the software that controls your PC's peripherals, for example the console and disk drives, and to add support for new devices, such as a RAMdisk or mouse. ANSI.SYS changes the console control software, the programs in DOS that interpret the codes sent from your keyboard and place characters on your display. It allows an application program to alter the input that will result from given keys and to change the attributes (that is, color, intensity, and so forth) and location (row and column) of output to the screen.

These functions are provided by a specific set of control codes sent to the console as part of an output string. In other words, some portions of a program's output appear on your screen, but other parts are intercepted by the device driver, ANSI.SYS, and produce the altered functions you want. It is important, of course, that the commands don't appear in normal output. To ensure that this doesn't happen, the control codes begin with an ASCII 27, the data link escape code. By convention, this character should never appear in an output string unless the program intends to send commands to a peripheral or its device driver. Many devices, for example the IBM printer, respond to the escape character by interpreting the next several characters as a command instead of as data. The standard console handler provided in DOS does not respond to escape codes, but ANSI.SYS does.

When designing ANSI.SYS, IBM selected a set of commands adopted by the New York-based American National Standards Institute or ANSI—hence the driver's name. The driver's incorporation of three ANSI standards (X3.4–1977, X3.41–1974, and X3.64–1979) permits the use of the many programs that are designed with the standards in mind (see Figure 1). With the new console device driver installed, the PC can use these programs. ANSI.SYS can also be used to develop programs for the PC or other systems with terminals that meet the standard. It is no longer necessary to include hardware-specific commands to control the display or cursor location. Program outputs can achieve the same results on any conforming hardware.

Unfortunately, the program output that is easiest for most of us to produce, BASIC print statements, does not pass through the DOS console driver and therefore bypasses ANSI.SYS. BASIC contains its own console handler, which does not respond to escape commands. It is possible for BASIC to write strings containing the escape code to disk files and to send these to the console using the DOS TYPE or COPY commands. A later article will explore this approach for both the console and various printers in considerable depth. In the rest of this article, we'll see how other programs can use ANSI.SYS to control the display and reassign keys with DOS commands.

PC-DOS provides a simple way to load device drivers. First, the file containing the driver software must be on the disk you will use to load DOS. To use the procedure given here, copy ANSI.SYS from the

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Command name	Function	Escape code sequence
CUP HVP	Both these commands move the cursor to line l# and column c#	Esc [l#;c# H Esc [l#;c# f
CUU	Move cursor up # lines	Esc [# A
CUD	Move cursor down # lines	Esc [# B
CUF	Move cursor forward # spaces	Esc [# C
CUB	Move cursor backward # spaces	Esc [# D
SCP	Save the cursor position	Esc [s
RCP	Return the cursor to the position it had when the last SCP was sent	Esc [u
DSR	Request console to send a CPR	Esc [6 n
CPR	Cursor is at line #l and column #c (The CPR is received by a program as if it had been entered at the keyboard.)	Esc [#l;#c R
ED	Clear screen and home cursor	Esc [2 J
EL	Clear line from cursor to end (ANSI specifies more erase options, but IBM does not support them.)	Esc [k
SGR	Set display attributes where # is 0 for normal display 1 for bold (high intensity) 4 underline 5 blink 7 reverse video 8 nondisplayed (invisible) (Options for color are in the DOS manual)	Esc [#;...;# m
SM	Put the screen in the indicated mode where # is chosen from 0 for 40×25 black and white 1 for 40×25 color 2 for 80×25 black and white 3 for 80×25 color 4 for 320×200 color graphics 5 for 320×200 black and white 6 for 640×200 black and white 7 to wrap at end of line	Esc [=# h
RM	Reset the modes described above	Esc [=# l

Figure 1: *ANSI standard console command codes implemented by IBM. ANSI.SYS does not display these strings, but rather takes the action indicated under "Function."*

DOS distribution disk to your working disk. Second, you must create a file called CONFIG.SYS that contains the following line:

```
DEVICE = ANSI.SYS
```

DOS 2.0 looks for this file whenever it is started and will install any device driver it specifies. The easiest way to create CONFIG.SYS is to enter the following commands after you start your system:

```
COPY  ON: CONFIG.SYS
DEVICE = ANSI.SYS
```

(You will not see the DOS prompt before entering the second line.) After entering these lines, press F6 or Ctrl-z and the Return key. Now restart DOS, and ANSI.SYS will have been installed.

At this point, your PC can use software written for terminals that use the ANSI standards. Programmers who are proficient in Pascal or assembly language can also write code that uses the extended keyboard and display control features. The rest of us are not left out, however, because there are still some clever things



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that ANSI.SYS can do using DOS commands alone. The trick is to find a way to generate the escape command.

Generating an escape is not as easy as you might think. If you press the Esc key in either DOS or EDLIN, your current line is deleted (although not removed from the display), and the system waits for you to reenter it. Most other editors use the escape key in combinations to provide additional commands. They will not allow you to embed an ASCII 27 in your files. There is, however, a DOS command that allows you to send escape sequences directly to the console.

The command is PROMPT, a little gem tucked away in Chapter 10 of the DOS manual under "Advanced Commands." Its purpose is to change the symbol that DOS uses to tell you that it is waiting for input, but it can do quite a lot more. The DOS manual states, "All text on the PROMPT command line is taken by DOS to be the new system prompt." If you enter:

```
PROMPT READY-
```

DOS will no longer signal you with A>, but will use READY- instead. You can create any prompt you want by changing the text that follows the PROMPT command.

Not all that text is taken literally, however. Some of it forms what are called "metastrings," groups of characters that take on special meaning. For example, if the PROMPT command includes the characters $t, DOS will not use them in the system prompt. Instead, it will replace them with the current time. Try entering PROMPT $t to see the effect. You will notice that entering PROMPT alone brings back A>.

The next installment of this column will offer an expanded list of metastrings that can be used in combination with the PROMPT command. The most important of these is the metastring $e, which generates an ASCII escape character and which will prove to be the key to using ANSI.SYS. ■

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XMODEM: A Standard Is Born

The XMODEM file transfer protocol ensures error-free transmission of machine language files and text. Some bulletin board operators have already adopted it as a standard.

"We're going 8 bits, no parity, and XMODEM," says one California computer bulletin board operator. "We're declaring it the standard by fiat—no ifs, ands, or buts." It may sound like gibberish, but he's talking about the groundswell of support for a much-debated file transfer method. It may be too early in the game to declare it the winner in the standards war, but it is the single important feature to look for in a communications package.

XMODEM, long a staple in the CP/M world from whence it came, has yet to become a computer industry standard, de facto or otherwise. Nonetheless, there can be no doubt that this technique for flawless file transmission over today's snap-crackle-pop phone lines is rapidly gaining sway.

The nation's bulletin board operators, particularly those who run RCPM (Remote CP/M) systems, are the people most responsible for XMODEM's popularity. But at a time when the phrase "I'll be working at home today" increasingly means firing up your home computer and downloading information from a corporate mainframe or desktop PC, XMODEM is moving into the button-down world of gray flannel and wingtips. Like a certain orange beverage and breakfast, XMODEM isn't just for hobbyists any more.



Perhaps the best way to get a handle on XMODEM is to think of it as a set of rules dictating how one computer will transmit its files to another and what kind of checking will be done to make sure that the files are received accurately. Although it was originally designed to transfer computer programs and is often spoken of in those terms, XMODEM can be used for transferring any kind of file. The key point is that both computers must be playing by the same rules.

This is an essential requirement for any protocol. And it is the reason why a program like *MITE/MS* from Mycroft Labs in Tallahassee offers IBM users at least four protocol options: MITE proprietary, CLINK/*CrossTalk*, Hayes' *Smartcom*, and XMODEM. But if it appears that yet another compatibility battle is shaping up in the microworld, don't bet against XMODEM. In addition to being a mature product with a large installed base, it has at least one other thing going for it—it's *free*. You may have to pay for the implementation, but the protocol itself was long ago placed in the public domain by its creator, Chicagoan Ward Christensen.

Since its introduction in 1978, XMODEM has established a statistically proven accuracy of between 99.5 and 99.99 percent. But to understand how it works its magic, an important distinction must be made between what in communications terms is called the "binary transfer mode" and the protocol itself.

You can think of communicating computers as having a "text display mode" and a "binary transfer mode." When it is in text mode, your machine can display all the letters of the alphabet, all the digits from 0 through 9, and most major punctuation marks. Equally important, when in text mode your machine is programmed to respond to certain "control codes" that govern the movement of the cursor on your screen and other niceties that make it easy to read stock quotes or electronic mail. With the exceptions of the characters responsible for returning your cursor or printing element to the far left ("carriage return") and scrolling the display up one line ("linefeed"), these control codes are transient. They do their job and pass on through. When you capture the informa-

tion coming in from the remote computer, they are not stored in the resulting file.

Text display mode does not work, however, when you want to communicate binary or "machine language" files such as .COM and .EXE programs. Also, those produced by BASIC when you save a program in its default (compressed) mode and files created by *WordStar* and several other word processing programs cannot be sent in text mode. The main reason this does not work is that these files contain characters outside the normal displayable range of ASCII characters. Some of them are interpreted as display control codes by the PC, while others translate to graphic

The process will not be completed if the received file is not error-free.

symbols. This misinterpretation isn't the intent, but when in text display mode, your communications program has no way of knowing that.

Consequently, the control codes in these files can cause the computer to do some crazy things. You can see this for yourself if you enter TYPE DISKCOMP.COM at the DOS command prompt. Notice how the cursor prints a line and then zips back and prints another line on top of it near the beginning of the listing.

The binary transfer mode solves this problem by telling the computer to take in every number it receives without comment, question, or on-screen response. Nothing is displayed. Everything goes straight into a RAM capture buffer or into a buffer and then into a file on disk. This is the only way to transmit a .COM, .EXE, or other machine language program, and in many cases it is the only way to transfer a *WordStar* file in its "as is" state, with all its internal control codes intact.

If static, electrical noise, or some other type of "line hit" causes a character in a text file to be garbled in transmission, it is usually easy to spot the error. But it's almost impossible to detect an error in code. And if the file consists of a machine language program, the consequences of a garbled transmission can be disastrous. If even a single bit is received incorrectly, the entire program can bomb.

Where Does XMODEM Fit In?

The XMODEM protocol solves this problem with a technique called "cyclic redundancy checking" or "CRC," a quintessential computer term if ever there was one. Fortunately, it is not difficult to understand. XMODEM's goal is to create an exact copy of a file on the remote computer's disk. Since nothing is going to be displayed, there is no need to send information in the 10-bit packets used to send each character when in the text mode. Instead, the transmitting computer chops a file up into 128-byte units called "blocks." It then assigns a number to each block and adds up the ASCII values of each byte as it is sent.

When the last byte in the block has been sent, the computer divides the total of the ASCII values by 255, which yields a quotient and a remainder. The transmitting computer throws away the quotient and sends the remainder to the remote computer. The number that is sent is called a "checksum," and it is the lynchpin of the whole checking process.

The remote computer adds up the ASCII values of each byte as it is received and performs the same division after the 128th byte in the block. If the remainder matches the checksum, it knows that the block has been received accurately. So it stores the information away and says, "Okay, send me the next block."

If the two checksums do not match, the receiving computer says, "We've got a problem here. Better send that last block again." If the block is still faulty, the process will be repeated until a total of ten attempts has been made. Should the last attempt fail, the program will abort the transfer.

The transmitting computer will finish up by sending a special signal indicating the end of the transmission. When it receives that signal, the other computer will close the file and finish storing it on disk.

You won't see much on your screen while the two computers are doing their stuff. Most programs supporting XMODEM will display the name of the file the machines are working on, the block number being sent or received, the number of times a block has been retransmitted because the checksums don't match, and similar information that most people don't need to be concerned with.

The important thing is that the process will not be completed if the received file is not error-free. And you know you can rely on an XMODEM-received file. For this reason, the protocol can be as important for communicating market studies, sales projections, and price lists as it is for transmitting programs. Whenever accuracy is critical, a transfer protocol should be used, regardless of whether you are dealing with a program or a text file.

XMODEM and the Future

There are other CRC protocols. Where they differ is in the size of the blocks, the divisor or constant they use to generate the checksum, the number of times they will retry a transmission, and the control codes the two computers use to talk to each other. Computer purists might argue about which is best. But like a single telephone, a transfer protocol is useless by itself. Its value varies in direct proportion to the number of people equipped to use it.

A growing number of software vendors are adding XMODEM capabilities to their communications packages. It may not yet be a de facto standard, but clearly things are moving in that direction. This is something to bear in mind when you are considering communications software. If the package you are interested in does not include XMODEM support, it might be worth a phone call to the vendor to see if and when this feature will be offered since you're probably going to need it. ■

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Bringing Out the Big Guns

If effective complaining has failed to resolve your equipment or software problems, here are some ways of really getting tough with the manufacturer, short of a lawsuit.

This is the second of a two-part excerpt from Computer Buyer's Protection Guide: How to Protect Your Rights in the Microcomputer Marketplace *by L.J. Kutten. The book is published by the Spectrum Book division of Prentice-Hall, Inc., Englewood Cliffs, New Jersey 07632.*

This portion tells how to escalate your complaints to really get action.

If your first round of complaints has not resulted in repair or replacement of your defective microcomputer, peripheral, or software, it's time to apply pressure. You want to get more people involved in your problem who have an interest in it and the product involved.

Before you can apply pressure, you must take care of the following points:

1. Write a clear and concise statement of the facts, using as much detail as possible.
2. Prepare full documentation. Make clear photocopies of all repair tickets, sale slips, letters, and the like.
3. Decide exactly what redress you want

Once you have done these things, the next step is to write to the president of the company that manufactures the goods involved. If a local store or mail-order company does not care if you have problems, the manufacturer will. Write a letter describing your travails with the local store and ask for help in resolving the problem. If the local store is a franchise, write the franchisor and complain.

If you do not get satisfaction from the manufacturer, it is time to increase the pressure and try to compel the manufacturer to make you happy. The easiest way to apply pressure is to write a few well-placed letters. Letters can be written to magazines in which the company advertises, local consumer groups, government officials, and the like. Every time you send a letter to someone, send a copy to the company.

- Write to any and all computer magazines you read in which the company advertises. You do not have to be a subscriber. Do not expect major action out of the magazine. All it will do is write the company a letter and ask the company to check it out and respond to the magazine. Usually the magazine will send you a letter stating it can be only a conduit for discussion and asking you to inform it if and when the problem is resolved. What is not clearly stated is the magazine's power. If it gets enough complaints about a company, it will alert its readers. Send the letter to each magazine the company advertises in.
- Write to government officals. Write to the President of the United States at the White House, Washington, D.C. 20500. The president's staff includes the Office of Consumer Affairs. This office advises the president on consumer affairs. Your letter will be forwarded to the appropriate government agency. Also write your congressman and senators. Ask them to forward your complaint to the appropriate congressional committee that deals with your problem.
- Write to the Federal Trade Commission's Bureau of Consumer Protection, Washington, D.C. 20580. The Federal Trade Commission rarely acts on individual complaints, but if it gets enough complaints from different individuals, it will investigate.
- Write to the attorneys general of the state where the company is incorporated or doing business and your home state. Supply them with details of your complaints, proof of payment, attempts to resolve the problem, and so on. Tell them that you are unhappy with the company and feel that it may be guilty of consumer fraud. Ask them to investigate. If the company is local, complain to your local district attorney, especially if you feel that you were the victim of a fraud or some deceptive practices. If the facts are bad enough, the prosecutor may file criminal charges. Although you may not recover your loss, your letter may help prevent someone else from suffering a loss.
- If a local newspaper or television station has an "Action Line" or "Hotline" feature, give it the facts. If your case can be presented as a good guy versus a bad

guy, if the facts can be briefly and simply explained, and if the case appears to be loaded with injustice, a reporter may investigate. Nothing scares any business (whether honest or not) more than learning that a local newspaper or television station is pursuing a story dealing with alleged bad consumer practices on the part of that business.

Send your complaint letters certified mail, return receipt requested.

Other Tactics

If you feel you have been defrauded and the U.S. mail was involved, complain to the local postal inspector's office. Your local post office can tell you how to contact the nearest inspector's office.

When you have sent a complaint letter, a favorite delaying ploy used by manufacturers and suppliers is to say, "This is the first I have heard of it," or "I do not have any record of receiving your complaint." Get around this ploy by sending your complaint letters certified mail, return receipt requested. The post office charges approximately $1.55 for this service. Before the letter will be given to the recipient, he must sign an official receipt, which is then returned to you. The receipt is proof that your letter was delivered.

Many people have trouble communicating their problems on paper. This situation is worsened when the company or vendor cannot read a complaint letter. Type the letter if possible. If you do not have or cannot get access to a typewriter, make sure your letter is legible and easily understood. Before mailing it, get someone else to read it because you are too close to the problem to be objective. This person will catch your spelling mistakes and tell you if the letter makes sense.

Always document a complaint. Send photocopies of invoices, repair tickets, and the like. Do not send the original documents. Most public libraries and post offices have copy machines available for public use.

Fighting Dirty

After every method we have previously discussed has failed, it is time to bring out the heavy artillery. Do not take lightly the tactics described in the following paragraphs. They are the equivalent of declaring war.

Most times, hiring a lawyer to resolve a consumer dispute is only throwing good money after bad. Lawyers cost money. With hourly rates going from $45 per hour on up, the legal bill can quickly overshadow the amount of money your computer problem involves.

This is not to say that lawyers do not have their place. Sometimes a letter from a lawyer can work wonders. If you feel a lawyer must be hired, try to get him to quote you a fixed fee for a letter only. Then see what happens. It may not be necessary for the lawyer to do more than write a letter.

When you hire a lawyer, find one who is familiar with consumer and warranty law. A good place to find this experience is in a lawyer who has poverty law experience. His or her previous clients will have had more consumer problems than the average person, and it is likely that this lawyer will know consumer law.

If a lawsuit is filed, make sure it is brought under the Magnuson-Moss Warranty Act because Magnuson-Moss allows you to recover your attorney's fees if you win your case.

The United States Constitution guarantees free speech, but the realities of business being what they are, very few computer magazines and newspapers will bite the hands that feed them. If your complaint is against a large advertiser, you could be 100 percent in the right, but the magazine is not likely to run a critical article for fear of losing the advertising.

However, you can exercise your freedom of speech by running a truthful advertisement in them yourself. Most computer magazines have a section in which consumers can advertise their spare equipment and software. Think of the reaction if you were to run the following advertisement:

> My Acme microcomputer is a lemon. Is yours? If so, add your name to a list of dissatisfied customers. Send your name, address, and your major complaint to Ronald Carter, 1040 E. Central, Jackson, MO 63001.

If you can give a magazine, the Federal Trade Commission, or any other consumer agency proof that there are many dissatisfied customers who have the same complaint, they will take notice. No longer is it just you; it is a large group.

Another alternative is to offer your microcomputer for sale. Consider the effect of the following advertisement:

> *For Sale:* GeeWhiz Model 100 Microcomputer with two GeeWhiz disk drives, extended memory, and much more. New cost $2,000; will sacrifice for $1,500 or best offer for following reasons: keyboard freezes up twice a day; disk drive crashes and loses data once a week; intermittent memory problems; interference with all televisions and radios within 100 feet, and much more. If interested, call Ronald Carter (314-123-4567), or write 1404 E. Central, Jackson, MO 63001.

So long as the advertisement is truthful, it is protected by the First Amendment. However, be warned that if you use a false statement, you can be sued for libel.

If there is a local computer festival, rent a booth to sell your machine. Make a sign similar to the "For Sale" advertisement.

If you can afford to give the unit away, make a gift of it to the president of the manufacturing company. Write him or her a detailed letter stating what is wrong with the unit and saying that you are making a gift of it to him or her. Ship the unit off and send copies of your letter to the various computer magazines. Because this is equivalent to a "man bites dog" story, some magazines may publish it. Alternatively, give the unit to a charity and take a deduction off your income taxes. ■

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COMING UP

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HI DISK MAGAZINE

Inflation Proofer
Protect your nest egg from inflation with this inflation-proofing tutorial. Create a diversified portfolio of investments and compare its performance to an optimal portfolio under five different inflation scenarios.

Shark Hunt
Teach a child the basics of fractions with this entertaining instructional program. Each correct answer is rewarded with shark hunting game action.

File Manager (Part I of III)
A powerful, integrated file management utility. Scroll through an alphabetized file list, or search for a specific file. Copy, rename or delete files. Parts II and III in the next two issues allow you to view or print whole files or parts thereof, all within one command environment.

Setkey
Redefine the operation of the function keys by assigning each up to four command strings (accessed by Shift, Control and Alt key combinations). Separate groups of command assignments can be saved for later use and displayed. Customize your function keys for all your commercial software as well as your own applications.

Wine Data I
A data file of wine ratings categorized by region and year with a program to display ratings by either category. This issue: French wines. Coming soon: wines of Italy and California.

Bug Feast
A single-player arcade-style game that pits a bug-hunting frog against the terrors of the wild desert, including spiders, snakes, and frog-trapping children.

Jigjags 1
Our first recurring feature combines the challenge of crossword and jigsaw puzzles in a new game concept. Can you beat the clock in making a valid crossword puzzle from puzzle parts? Three new puzzles in every issue!

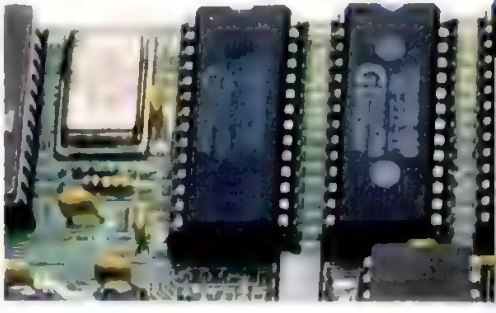


Flip the pages. You see PC modem cards with fewer features advertised for as much as $599. Up until now that's how much it cost to make a modem capable of transmitting at 120 characters per second (1200 baud). It doesn't take a computer to figure out the savings in phone line charges when you communicate four times faster than the 30 character per second modems (300 baud). Now you can have the solution to your communication needs at an affordable price.

SEE HOW THEY WORK

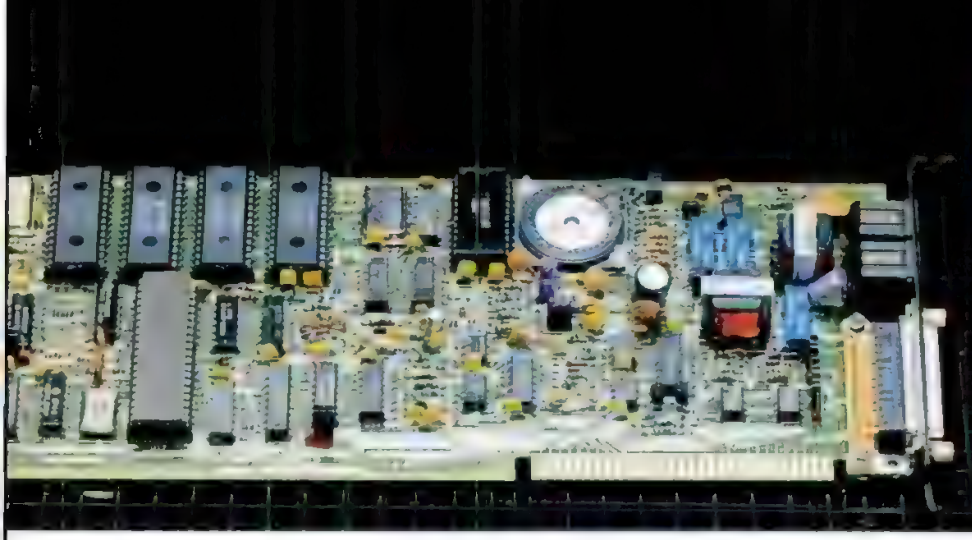
You can image how precise the components have to be to convert tones over a phone line into 120 characters every second. Precision equates to cost. With the advent of the mass market in personal computers the economies of scale drove the costs of manufacture down, but did not effect the precision required. The technology used is called "analog filtering". It is the process of sending (modulating) and receiving (demodulating) tones with perfect pitch. A lot of adjusting, noise suppression, and a little magic is required. Real expensive. Some use lots of chips and filters (known as discrete components). The latest rage is LSI (Large Scale Integration) technology. Which is the same old analog stuff condensed onto fewer chips.

ADVANTAGE #1
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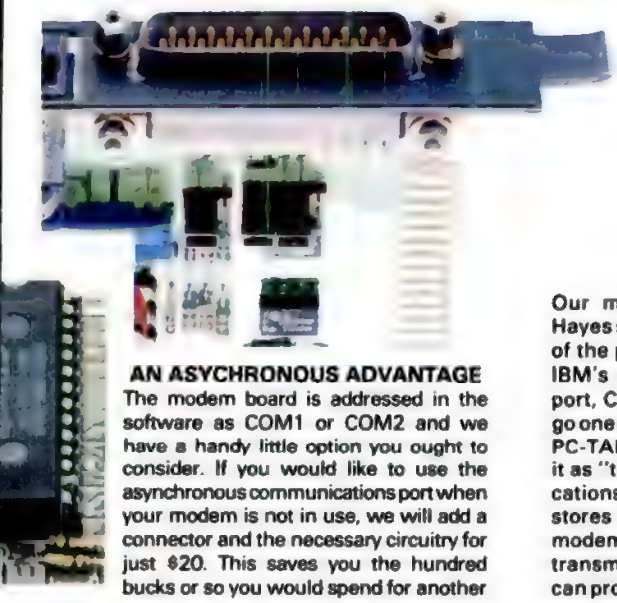
A GENUINE BREAKTHROUGH

NO CORNERS CUT

We included every feature you would want in a modem card. It's FCC registered for direct connection to your modular phone jack with the cord which is included. There is a separate modular jack for your telephone or you can listen through the onboard speaker. The auto-dialer works on rotary lines, tone lines, or a combination of both, and will pause for use with Sprint or MCI. It will work in originate or auto-answer modes. A separate microprocessor, a Z8, controls all the functions.

ADVANTAGE #2

Optional external serial port connector



AN ASYCHRONOUS ADVANTAGE

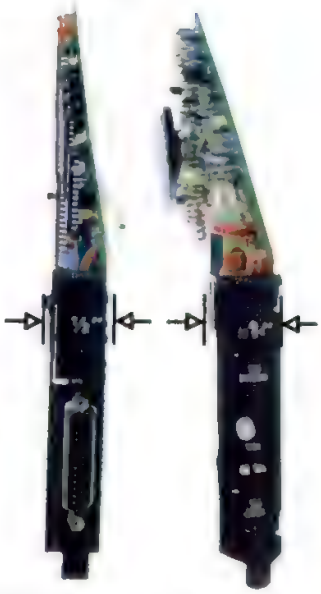
The modem board is addressed in the software as COM1 or COM2 and we have a handy little option you ought to consider. If you would like to use the asynchronous communications port when your modem is not in use, we will add a connector and the necessary circuitry for just $20. This saves you the hundred bucks or so you would spend for another async card and saves a valuable slot. It can be configured as COM1 or COM2 and works just like IBM's does.

THIN IS IN

It plugs into your IBM PC or XT and occupies any one slot since it is just 1/2 of an inch thick. This is made possible by using a special speaker which is just 1/8" tall. Competing brands either use a convential cone type speaker, or they just skip the speaker altogether. Some modems also have large transformers which allow for valuable space

ADVANTAGE #3

Just one slot in PC or XT



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Our modem is 100% compatible with the Hayes software commands so you can use any of the popular communications packages like IBM's Asynchronous Communications Support, CrossTalk, Transend, or PC Modem. We go one better than the competition. We include PC-TALK III. PC WORLD magazine referred to it as "the benchmark that other PC communications packages are measured against." It stores phone numbers, handles setting the modems characteristics, saves to disk files, transmits from disk files, even binary files. You can program up to forty keys to have things like passwords and log-on information be entered when you hit them. And to make sure data is sent and received accurately, the XMODEM protocol detects errors caused by poor line quality and automatically retransmits the data.

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CIRCLE 172 ON READER SERVICE CARD

COMING UP

FOR IBM PERSONAL COMPUTER USERS

TECH JOURNAL

ANS COBOL Standards

How do the four major COBOL compilers comply to ANS standards? A feature-by-feature comparison of compilers from Microsoft, Micro Focus, Ryan-McFarland, and mbp to the ANS COBOL X3.23-1978 standard.

Trace86 and Codesmith-86

Members of the new generation of assembly language debugging tools, Trace86 and Codesmith-86 are two powerful, memory-mapped, program-tracing utilities.

High Resolution Timing on the PC

Standard timing information available to PC users is close to useless for events measured in electronic time scales. A look at some techniques for obtaining timing information with microsecond resolution.

LISP for the PC

A language implemented on large minis and mainframes to satisfy the research needs of the artificial intelligence community has come to the PC. An in-depth review of three LISP products: IQ LISP, TLC LISP, and muLISP.

Sorting Methods and Timing for the PC

Alternatives to the easy-to-code but very slow bubble sort: Implementation and performance of eight sorting algorithms for the PC.

Routines for Controlling Sounds on the PC

An excerpt on sounds from the Waite Group's *Bluebook of Assembly Routines for the IBM PC*, with program listings for producing various sounds, including a routine to play music on the PC.

Tale of Two Mice

Product review: How do Microsoft's mechanical mouse and Mouse Systems' optical mouse fare in the electronic maze?

Index To Advertisers

RS #	Advertisers	Page
102	ABM Computer Systems	206
104	ACI Computer Corp.	246
111	Advanced Computer Products	328
115	Advanced Ideas	107
194	Alloy Computer Products	231
101	Alpha Software	2
139	Alpha Software	3
833	Alternative Software	29
105	Amdek Corp.	68
116	American Training International	17
*	Ann Arbor Software	14
118	Apparet	160
120	Applied Computer Products Corp.	90-91
128	Artificial Intelligence Research Group	340
157	Ashton-Tate	157
153	Ashton-Tate	450
107	Ashton-Tate	310
154	AST Research	80-83
156	Atron	56
140	Balis Computers	340
831	Best Programs	53
117	BHRT Nevada	324
121	Bizware	285
150	Blaise Computing Inc.	401
114	Bonnie Blue Software	63
*	Borland International	43
109	The Boston Company	279
155	Bottom Line	72-73
163	Bristol Information Systems	347
124	Business Solutions	89
127	Bytewriter	286
129	Call Computer Manager	429
219	Celestial Software	320
238	Chang Laboratories	112
112	Chemical Bank	96
123	Coefficient Systems	50
*	Compaq	18-19
228	CompuAdd	218
172	CompuCable Corp.	464
199	CompuCart	28
130	CompuMail	411
457	Compusave	449
131	Compuserve Information Service	100
192	Computer Control	338
183	Computer Mail Order	92-93
266	Computer Outfitters	300
162	Computer Outlet	384
135	Computer Warehouse	277
133	Connecticut Software	448
180	Conroy LaPointe	94-95
196	Contemporary Computerwear	444
113	Context Management Systems	48
200	Coosol Inc.	404
215	Corona Data Systems	54
137	Cosmos	106
202	Creative Computer Products	352
205	Creativity Unlimited	411
125	C Source	284
*	Curtis Manufacturing	355-357
134	Daisy Net-Int'l	346
136	Data Base Ind.	356
515	Data Sources	319
126	Data Storage Solution	368
106	Data Technology	225
221	Decision Resource	65
187	Delta Point Software	386
119	Dessert Technologies	364
307	Diamond Software	79
222	Diamond Software	78
444	Digital Communications	30-31
138	Digital Research	66-67
318	Digital Supply Co.	23
142	Dilog PC Products	302-303
179	Diskette Connection	444
145	Disk World	356
185	Dow Jones Software	163
147	Dysan	1
220	Ecosoft	444
832	Elek-Tek	299
348	E.P.S. Inc.	283
165	Everex Systems	235
164	Everex Systems	233
148	Falcon	289
110	Fastware	45
132	Ferox Microsystems	299
241	Financier Inc.	9
218	Floppy Disk Services	392
248	Fox & Geller	26
*	Fred Deeg & Assoc.	408
268	Friendly Soft.	70
250	F.T.G. Data Systems	44
306	Funk Software	377
160	G.M.S.	456
301	Good Software	332
368	Gould	400
313	Great Lakes Computer	381
260	H&E Computronics	470
198	Harvard Assoc.	365
303	Hayes Microcomputer	336-337
159	Helix Laboratories	11
261	Hercules Computer Technology	8
308	Houston Instruments	242
382	Ibex	444
269	IBM	24-25
166	I.B.S.	286
*	IDE Corp.	178
392	Image Processing Systems	293
529	Individual Software Inc.	20
270	Inmac	467
271	Innovative Software	274

INDEX TO ADVERTISERS

RS #	Advertisers	Page
167	Intra Computer	365
141	Iomega Corp.	188
175	Jade Computer Products	459
168	James Electronics	468
170	John Wiley & Sons	354
144	Kensington Microware	325
143	Kensington Microware	324
171	Kensington Microware	313
289	Keytronics	164
174	Knowledge Systems	228
276	Laboratory Microsystems	410
*	Lawrence Woodwork	325
380	Leading Edge	Cover 2
385	Lifetree Software Inc.	220
122	Lionheart Press	468
217	Lite-Pen	298
282	Logicsoft	294
386	Magnum PC	437
437	Maynard Electronics	315
188	M.B.S.I.	5
290	MCP Applications	366
525	M.D.B.S/Knowledge Man	114-115
151	Meca	236
216	Meca	239
265	Microcentre	316
272	Microcomputer Acces	339
316	Micro Concepts	468
176	Micro Design	354
315	Micro Flash	461
283	Microfocus	217
281	Micrografx	322
280	Micro Hotline	375
516	Microlog	86-87
502	Micro Mart	40
503	Micro Mart	438-439
320	Micromatch	394
224	Microplot Systems	288
*	Micro Soft	108-109
468	Micro Storehouse	314
326	Microstuf Inc.	267
312	Microtax	61
235	Micro Ware	42
341	Micro Xpress	334
340	MLI Microsystems	460
337	Mylex Corp.	307
230	Natural Software	407
*	Network Consulting Inc.	241
346	Norton Utilities	378
460	Novation	318
279	Omega Software	241
351	Oryx	304-305
527	Palantir Software	358
173	Panasonic Industrial Co.	74
486	Paradigm Consultants	301
484	Paradise Systems	351
*	P.C. BRAND	104-105
339	PC Connection	248-249
403	P.C. Link	389
535	P.C. Network	100-101
352	P.C. Software Interest Group	401
500	PCT	446
499	P.C. Warehouse	292
365	Persoft	260
540	Personal CAD Systems	98-99
369	Personal Computer Products	333
512	Persyst	158-159
530	Physical Science Inc.	460
532	Pipeline Computers	396
304	P.M.I. Microwholesalers	378
299	Princeton Graphic Systems	202
374	Professional Software Inc.	21
383	ProfitSystems, Inc.	223
400	Prometheus Products Inc.	103
223	Pyxel	311
203	Quadram Corp.	12-13
206	Quadram Corp.	22
330	Quala	326
427	Quantum Software Systems	362
379	Qubie Distributing, Inc	116-117
227	Qubie Distributing, Inc.	462-463
493	Quest Research Inc.	245
824	Rapitech	369
387	Readi-ware Systems	403
388	Realia	460
806	Reston Publishing	447
536	Robert J. Brady	36-37
504	Rocky Mountain Software Systems	47, 300
182	Rogue River Software	276
438	Rosesoft	59
443	R.T.C.S. Corp.	44
*	Safeware	399
*	Santa Clara Systems	212-213
278	Satellite Software International	10
189	Science Management Corp.	330
*	Scottsdale Systems Ltd.	360
447	Screen Data Corp.	4
370	Seequa	32
823	Sensible Designs.	251
401	Sigma Designs	329
186	Simonton Industries	306
191	Small Bus. Tech.	409
184	Softcraft	261
190	Softline	273
177	Softlogic Solutions	370
178	Softstar	64
253	Softstyle	312
208	Software Advisor Telesoft	320
473	Software Building Blocks	410
193	Software Solutions	247
404	Software Toolworks	468

INDEX TO ADVERTISERS

RS #	Advertisers	Page
477	Software Systems	51
497	Spectrum Software	341
396	Star Micronics	219
430	STB Systems Inc.	Cover 3
195	Such a Deal	391
474	Sysgen Ind.	440
470	Systemate	308
441	Systems Management Assoc.	132
445	Tallgrass Technologies	27
345	TAVA/Compushack	428
375	TAVA PC	121
201	TAVA/Micromail	348
501	Tecmar Inc.	170-171
*	Tecmar Inc.	C-4
424	Thoughtware	344-345
801	Time Accountant	287
209	Titan Technologies	327
436	T.P.S. Electronics	410
803	Transend	290
207	T'seng Labs	85
810	Unisource	38
469	Ven-tel Inc.	88
475	Vertex Systems	77
450	Virtual Combinatics	250
197	Visual Computer	110-111
402	Walonick Assoc.	460
*	Warehouse Software	278
476	Westico	340
210	Xanthe	361
211	X.D.S. Mfg.	342

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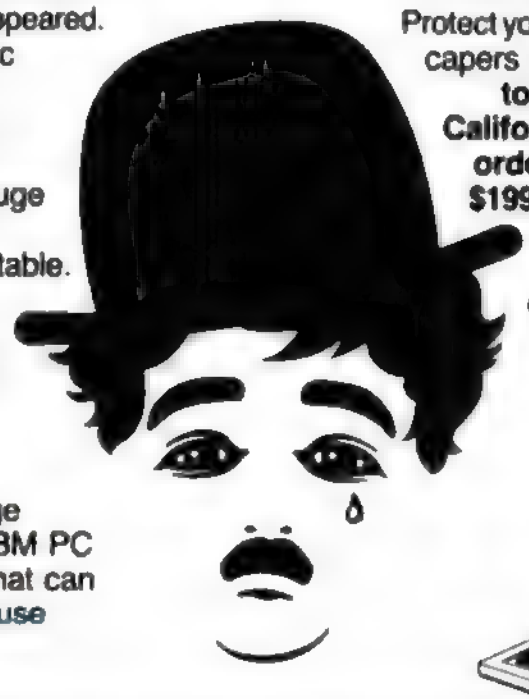
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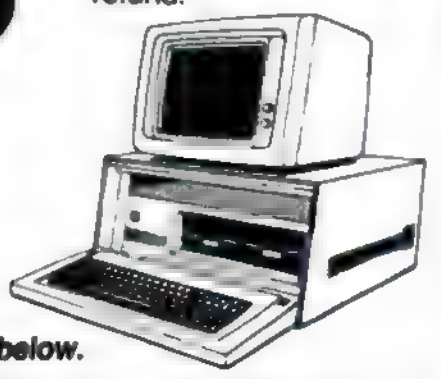
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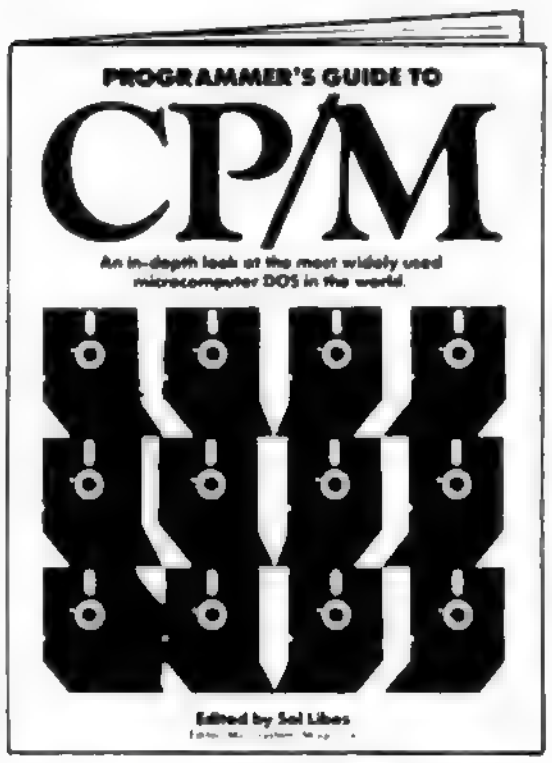
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CIRCLE 270 ON READER SERVICE CARD

PROGRAMMER'S GUIDE TO CP/M

Edited by Sol Libes

Here's an important collection of CP/M insights that you'll never find in any CP/M manual. CP/M is the most popular microcomputer DOS in use today, and this widespread use has generated many innovative techniques and enhancements of CP/M. *Programmer's Guide to CP/M* tells you what these enhancements are and how to put them to use, how to get around apparent limitations of a CP/M system and why CP/M is far more versatile than you might have imagined. Every article in *Programmer's Guide to CP/M* originally appeared in MICROSYSTEMS between January 1980 and February 1982. Except for this collection, these articles are now unavailable! *Programmer's Guide to CP/M* gives you an in-depth look at CP/M from the viewpoint of the programmer—the individual who creates the software that interfaces directly with CP/M, or who is installing CP/M on systems for which configurations do not already exist.



Contents include "An Introduction to CP/M," "The CP/M Connection," "CP/M Software Reviews," "CP/M Utilities & Enhancement," "CP/M 86" and "CP/M Software Directories." $12.95.

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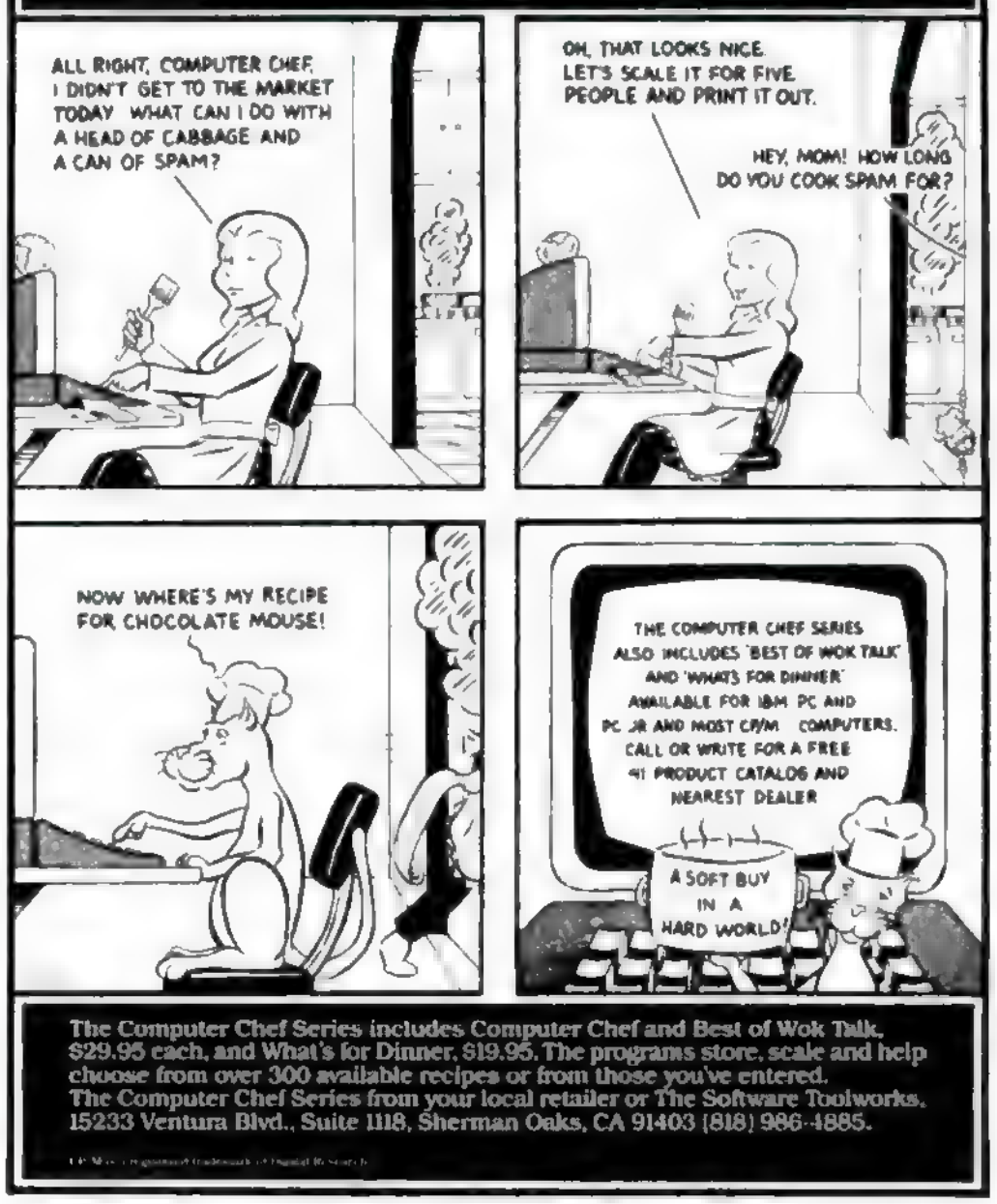
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The Independent Guide to IBM Personal Computers

Coming Up

All in the Family

Has your mother been nagging you to teach her how to use a PC? How about your brother or your spouse? Do you keep putting them off because you fear a family feud? Here's a look at several people who instructed one or more of their family members in the art of handling a PC—and survived to tell about it.

The IBM Watchers

The Gartner Group, The Yankee Group, and Future Computing are strange, semimystical organizations that exist primarily to see into the future and outguess IBM. A correct guess could mean substantial financial rewards for these companies and their clients. *PC* presents a series of profiles of these professional IBM watchers.

Painting with Pixels

PC brings you the story of how Barry Waldman created the most elaborate computer printout we've ever seen. After you see these amazing computer-generated graphics, you just might be tempted to follow Waldman's step-by-step instructions and conjure up some designs of your own.

MAC-PAC/PC

Formerly for mainframes only, MAC-PAC is now ready for the PC. We review this high-end executive-support system that helps manufacturing executives make decisions and plan ahead.



Illustration: Andrew Shachat

Macro Keyboards

Have you ever dreamed of pumping up the power of your PC's keyboard? *PC* takes an in-depth look at how to create a macro keyboard. We discuss how *ProKey* can simplify *WordStar* functions, and ways you can create custom character sets. In addition, we test and compare the capabilities of several software packages—including Lotus' *1-2-3* and *SuperCalc*^{3}—to create more powerful keyboards.

VENTURE and PLAN80

PC presents a side-by-side comparison of *VENTURE* and *PLAN80*, two programs that bring the power of mainframe financial-modeling packages to desktop microcomputers. Both packages can produce detailed projections for production, sales, cash flow, assets, depreciation, and a host of other financial forecasts. We tell you whether either one is right for your business.

PC Goes to College

PC goes back to school to learn why scholars in many disciplines are employing PCs to run classes as well as to help them conduct, organize, print, and publish their research.

Writers, PCs, and Typewriters

A style writer for the *Washington Post* discusses how microcomputers are changing the nature of creative writing. He explores how writers are affected by the switch from reams to bytes. Do editors detect a difference in the writing produced this way? How can writers profit from understanding the process?

Energraphics

We review *Energraphics*, one of the first packages to permit two- and three-dimensional imaging as well as CAD on the PC.

Plato Homelink

Out of its roots in educational programming for schools, Plato Homelink has grown into a new on-line, general-interest utility. *PC* introduces you to the new Plato that provides not only educational tools for schools and businesses, but game programs as well.

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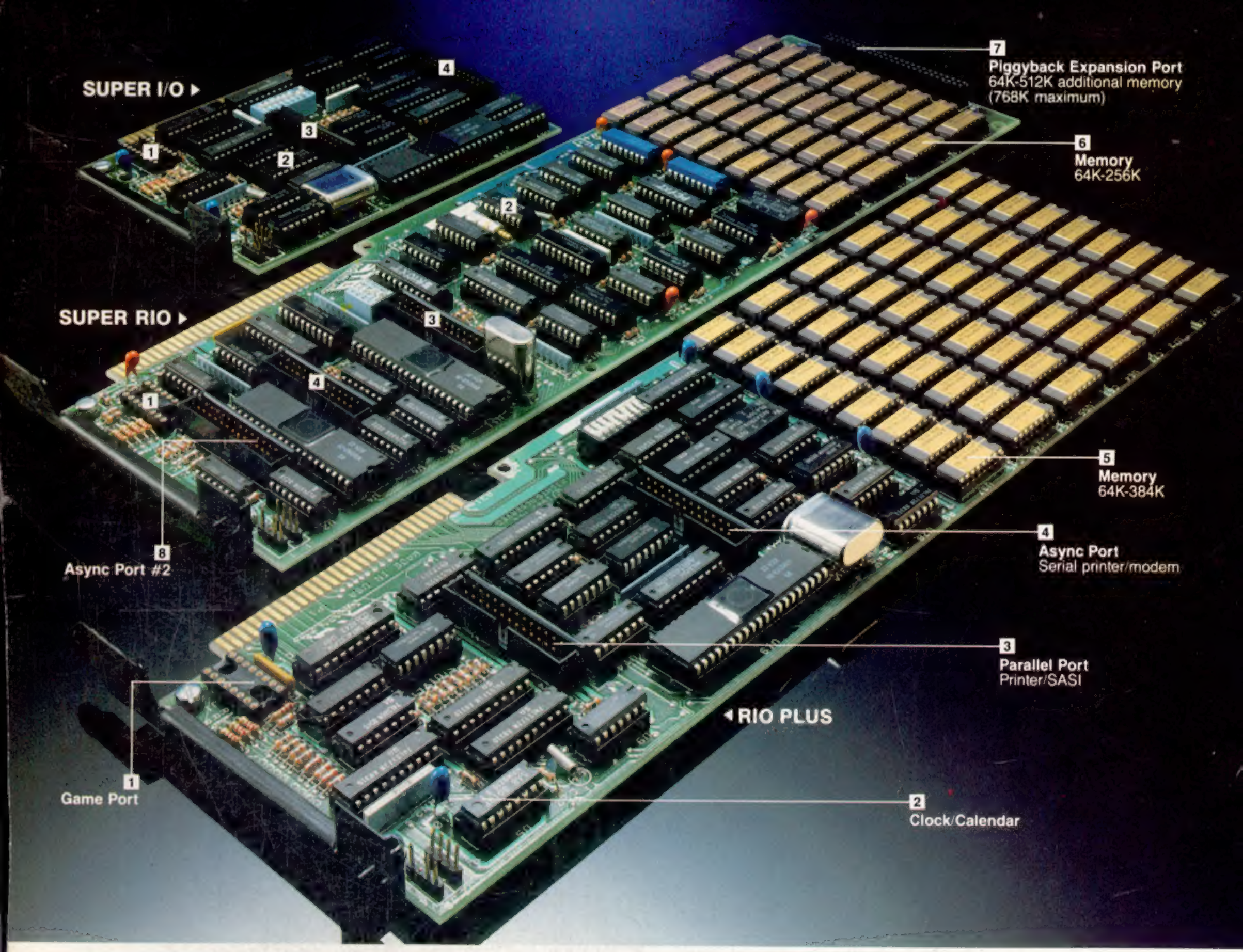
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